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ABSTRACT

Written for a variety of audiences, this volume describes the University of Western Ontario Preschool Project in sufficient detail to permit its replication; findings of formative and summative program evaluations are reported along with research developing new criterion measures of social competence. Begun in 1973, the program was primarily designed to meet the needs of economically disadvantaged preschool-age children in Canada. For comparative purposes, high income/high ability and low income/average ability groups attended the preschool. The children were tested for growth on intellectual and cognitive abilities, problem-solving styles and strategies, and social competence. Findings revealed that all three ability groups made significant gains over time on all measures. Chapter 1 of the present volume provides background information about intervention and research programs. Chapters 2 through 5 provide curriculum materials in the areas of number, classification, and spatial relations. Chapter 6 describes program modifications and special studies conducted in the third and fourth project years. Chapter 7 describes the development of a measure of social competence. Chapters 8 through 11 describe methods and discuss results of the summative evaluation of immediate and long term program impacts. Chapter 12 presents a summary and conclusions. Completing the document is an epilogue viewing the project and related issues from an updated (1983) perspective and exploring implications for social policy. (RH)

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A CANADIAN APPROACH

COMPENSATORY EDUCATION IN THE PRESCHOOL

THE UNIVERSITY OF WESTERN ONTARIO PRESCHOOL PROJECT

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MARY J. WRIGHT

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Preface

It was during World War II that my interest in compensatory early education for children from low-income families began. The British Government had invited W. E. Blatz, then the Director of the Institute of Child Study at the University of Toronto, to recruit a team that would go to England to help with the training of staff for Britain's war-time day nurseries. I was selected as the junior member of that team. On Dominion Day, July 1, 1942, in a partially bombed-out school in the core area of Birmingham, our training school (Garrison Lane Nursery Training School), with its demonstration day nursery, opened its doors.

As early as the late 1930s there was some evidence which suggested that the nursery school could have an important impact on the intellectual development of the underprivileged child. The initial findings of Beth Wellman (Wellman & Pegram, 1944) had been reported, and her claim that intelligence was environmentally determined was being hotly debated. Since working class families were served by the Garrison Lane Day Nursery, it was decided that the opportunity to measure the effects of the Canadian Institute of Child Study early education program, which was replicated at Garrison Lane, on the intellectual development of these children should be seized. Accordingly, the youngsters were given the Stanford-Binet Intelligence Scale every six months and I was assigned the task of administering the tests. The results obtained were similar to those reported by Wellman. The IQs of most of the children increased, in some cases as many as 20 IQ points (Blatz, 1944, p. 254). The burning question was, however, "why?" Unlike Wellman, the Garrison Lane group assumed that the intellectual potential had always been there and proposed that what the nursery school experience did was create the motivation to learn and encourage the development of habits (exploration, persistence, resourcefulness) which insured greater achievement. Hence, although the causes of the changes in the children were debatable, it seemed clear to me that something in their nursery school environment was making up for something which was lacking in their non-nursery school environment, and that this "something" was needed to support their development toward the realization of their full potential. My faith in the potential of preschool education for producing miracles in disadvantaged children was firmly established.

After the war I completed my doctorate in psychology and joined the faculty at Western Ontario as a child psychologist. However, I never lost interest in early childhood education. I worked with and supported the efforts of the Early Childhood Education Association of Ontario to improve the quality of our preschools by promoting the development of high quality training programs in early childhood education, and by establishing a system for credentialing early childhood educators. Also, in the late 1940s, while still a young Assistant Professor, I made my first attempt to persuade our university to establish a demonstration preschool and child study center. I even obtained approval for a grant from federal sources to support such a center. The grant was, however, for only five years, and was conditional on the awarding of a matching grant by the province. As a result the federal money was blocked, either at the provincial or university level (I never found out which), presumably because the danger of being left with funding responsibilities after the five-year period was a risk that one or other of these authorities was unwilling to take.

My second and successful attempt to establish a university laboratory preschool was made at a more auspicious time—in the second half of the 1960s when universities were expanding rapidly and when funds were relatively plentiful. Furthermore, I was then in a more influential position as a Professor and the Chairman of the Department of Psychology. At this time we were engaged in planning new and greatly expanded laboratory facilities for what had become a very large department and I was able to persuade my colleagues and the university's administrators that the need in Ontario for training at the graduate level in early childhood education was acute. The Institute for Child Study at the University of Toronto, which had formerly provided such training had ceased to do so and the supply of highly qualified persons in the field was rapidly diminishing. In addition, competent instructors were desperately needed for the many community colleges which had established training programs in early childhood education in the late sixties. Thus plans were made for including a laboratory preschool in our new building. We moved into this building in the fall of 1972 and during the academic year 1972-73 made the preparations necessary for opening the preschool in the fall of 1973. A senior honors course in early childhood education was offered by the Department for the first time in 1972-73 and training at the graduate level began in the following year. (The latter was offered as an option in the Master's or doctoral graduate programs in developmental psychology.)

The University of Western Ontario (UWO) Preschool Project was launched in 1973 at a time when compensatory early education at the preschool level was under attack. In the United States, the controversial but so-called disappointing results of the National Impact Study of Head

Start had been reported and were being discussed widely in Canada as elsewhere. It was also a time when Canadians were just beginning to launch, on a large scale, pre-kindergarten classes to aid the disadvantaged child. It seemed that the danger was real that "the baby might be thrown out with the bath water."

Because of my war-time experiences, the apparent outcome of Head Start was difficult to accept. What had gone wrong? Were the evaluation procedures inadequate or were the programs inappropriate? Thus, when the Department of Psychology at Western Ontario opened its laboratory preschool I wasted no time in initiating the project in compensatory education described here. It was a project of considerable magnitude which spanned as many as seven years. First, the program had to be started and pupils, including ones from low-income families, had to be recruited and studied. Then the program had to be modified on the basis of the results of those studies and evaluated. The first part of this report deals with the development of the program and its operation; the second part, with its evaluation. The evaluation proceeded through two phases. First, the immediate impact of the program was assessed, while the children were still in the preschool. Later, in a follow-up study, its long-term impact was measured. The focus throughout was on evidence of compensatory effects for the low-income children.

A project of such scope was not accomplished without an army of helpers. These included the preschool staff, the research staff, university colleagues, many professionals in the community, and of course the children who were subjects and their parents. Four of the preschool teachers who were involved in the project during most or all of its duration deserve special mention. These were Norm Greenberg, the supervisor of the program for the first four years, Carol Wagg, Sandra Gatt and Karen Whistlecraft. They read and criticized my first attempts to write a description of the program and each of the three women collaborated with me in writing one of a set of three chapters which describe our Assessment and Curriculum Guides. All four helped develop a set of rating scales which were used in the evaluation of the program and, in many other ways, assisted in the research effort. However, their greatest contributions were made as co-designers and implementers of the program. Two other teachers should also be mentioned. These were Joy Elder who supervised the program in the fifth project year and Kathryn Anderson who joined the staff in the fourth project year.

On the research staff, there were three persons who worked on the project throughout its duration. These were Ada Meecham, Merle Thurlow and Bernice Hill. Their devotion and expertise were invaluable. The statistical consultant was my colleague R. C. Gardner who always found time to advise me and my assistants, Jacqueline Tetroe, Mark

Marschark and later Hans Breiter and Mary Finlayson on how to manage our masses of data. Others who were also important assistants on the project were Brian Wilson, Malcolm Shantz and Nina Howe McCann.

To locate and recruit low-income children for the project was not an easy task. We were aided in this especially by the London Family and Children's Services Agency, which coordinated our efforts during the first two project years under the able direction of Phyllis Barnes. Medical officers and many public health nurses also helped with this task.

The follow-up study in the primary grades could not have been done without the gracious support provided by the London [Ontario] Board of Education, the London and Middlesex County Separate School Board and the Middlesex County Board of Education, and without the help and cooperation of their directors, some fifty school principals and many more primary grade teachers. The efforts of the teachers who prepared lengthy reports on the children each year were deeply appreciated. Special thanks are also due to the many children who participated in the various phases of the project and to their parents who permitted them to do so.

Finally, there were many others without whose extraordinary efforts this project could not have been concluded successfully. These included George La Hive who transported the low-income children to and from the preschool and provided them with a warm but firm grandfather figure, and the housekeeping staff in the preschool who never complained about their many clean-up chores. Also there were the secretaries who typed the manuscript—two of the most devoted of these were Lesley Van Duzen and Linda Tupholme.

—Mary Wright
1983

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A CANADIAN APPROACH

COMPENSATORY EDUCATION IN THE PRESCHOOL

Prologue

The project described in this monograph was initiated almost a decade ago. When preparing the final report we were tempted to write the introduction with reference to current thought, but we resisted this temptation in order to preserve the historical perspective of the work. Instead, an Epilogue was added in which the issues we struggled with in the early 1970s are re-considered with reference to more recent knowledge and to the views of developmental psychologists and early childhood advocates in the 1980s. The implications of the insights gained in the last decade for *social policy* are also discussed and summarized in the Epilogue.

In writing this monograph we attempted to achieve two objectives: first, to describe our research and report our findings and, second, to describe the University of Western Ontario (UWO) Preschool Program in sufficient detail to permit its replication. To us, the second objective was as important as the first. Since the teacher's role is of paramount importance in our program, in preparing the chapters on the program, the needs of the teacher were kept very much in mind. Consequently, instruction and actual program materials are offered in the three chapters which deal with the more controversial areas of our curriculum, specifically number, classification and spatial relations (Chapters 3-5). There are some educators who continue to argue that "number," for example, has no place in the preschool curriculum. Therefore, information about child development is offered both to justify the selection of these curriculum areas and to clarify our goals. These three chapters and their appendices were written in collaboration with the teachers in the preschool in the way that they thought would be most helpful to other teachers. The teachers were deeply concerned about the explication of their methods in the cognitive areas, because it was in these that their greatest efforts to advance knowledge and to be creative as teachers were made. They tried to do two things: first, to find practical ways of assessing the cognitive levels of the children which would enable them to solve, more successfully, the problem of how to match intellectual challenges to the developing abilities of individual children and, second, to discover strategies which were effective in involving children in problem-solving thought. The first goal was achieved by developing a set of Assessment and Curriculum Guides, the second by developing an inquiry approach in which the challenge was addressed more to the teacher than the child. The Guides are presented in juxtaposition with the text (as appendices) to facilitate understanding, and examples are provided to illustrate the type of teacher-child interactions which were promoted in the UWO Preschool.

The research done in the project was of three types. The monograph is organized around the first type, which is the summative evaluation of the program's short- and long-term effects on a wide range of competencies. The second type consisted of formative or process evaluations of the program. In these, attempts were made to monitor exactly what went on in the preschool and to determine how frequently the children were actually exposed to interventions which were considered potentially critical. Some studies of how manipulations of specific program variables affected immediate behavior were also done. The third type of research was aimed at developing new criterion measures when no acceptable ones were available. Our primary effort in this area focused on finding an objective way to measure children's social competence. This work was done in four phases during the first five years of the project. The results indicated that social competence is best reflected in the effectiveness of a child's attempts to influence his or her peers. The measure of social competence used to assess the immediate impact of the program on the children's social abilities was based on these findings and a report on this work has been published elsewhere. For the convenience of the reader, however, this material is presented in Chapter 7.

The monograph was, therefore, written for a wide variety of audiences: students at both the college and the university level, early childhood educators already at work in preschools and day nurseries or teaching in the kindergartens or special education classes of our schools, researchers, both developmental psychologists and educators, child advocates concerned with protection and prevention, policy and decision makers in the educational and welfare fields, and parents.

For the college student there is, in the description of the program, much practical information about how to set up a preschool, organize its staff, plan its curriculum, administer its program and stimulate and interact with the children. For the university student and research community there are research findings. Of particular interest to these groups will be the theoretical underpinnings of the program as well as the problems which were faced in evaluating it. Early childhood educators, kindergarten and special education teachers will, we believe, find the Assessment and Curriculum Guides of special practical assistance in coping with the problem of individual differences in their classes and in planning educational challenges for their pupils which are appropriate in difficulty. Research psychologists and educators with an interest in social and cognitive development and how these are interrelated should find the research on the development of social competence of great interest. They may also find the measure of social competence, which was developed for the project, a useful instrument for their own research. Child advocates will find the evidence presented here that early intervention can have a long-term beneficial impact on the competence of children both gratifying and useful. For policy makers there are several recommendations. These go beyond the suggestion that more early education should be provided for more children, but point out how the early education that is offered can be made effective and worth its cost. Finally, this monograph provides insights for parents into what lies behind an early education program of high quality, insights which should assist them greatly in choosing a preschool for their own children.

1
Introduction

The Need for Canadian Research

In 1973, when this project started, there was little information about the characteristics and needs of Canadian disadvantaged preschool-aged children and only a very few Canadian studies on the effects of preschool education on such children had been done (Ryan, 1972). Thus, in Canada, where pre-kindergarten programs to aid the disadvantaged child were springing up everywhere, Canadian educators were forced to rely on research done in other countries to guide their efforts. Most of them utilized the Head Start literature coming out of the United States, but there were many reasons for questioning the wisdom of this. Not only were the long-term results of Head Start discouraging, but many were arguing that in Head Start the needs of the disadvantaged had been wrongly identified (Baratz & Baratz, 1970) and that many of the programs designed for them had, therefore, been inappropriate (Ginsberg, 1972). Furthermore, there was reason to believe that disadvantaged children in Canada might be different from their American counterparts. Tulkin (1972) had pointed out that in many American studies, cultural and economic disadvantage had not been adequately distinguished, and that the long lists of deficits which were said to characterize the children of the poor might be reflecting the biases of the culture of the majority rather than the results of poverty. Speaking in Detroit at the 1971 Merrill-Palmer Conference, Professor William Fowler of the Ontario Institute for Studies in Education, who had wide experience working with disadvantaged children in the United States, commented that in Toronto he had not encountered the abject poverty which was common in large American cities. Also, an American DISTAR instructor speaking in London, Ontario, at about the same time, said that she had not encountered, even in Toronto's "cabbage town" (that city's most deteriorated section), the severe language handicaps or dialects that were common in disadvantaged children in the United States. Thus, Canadian research in this area was desperately needed.

The Concept of Disadvantage

The concept of disadvantage is a global one and the term is difficult to define. It has been used to cover a wide range of different types and degrees of economic and emotional disadvantage, as well as social discrimination. In this study, an attempt was made to avoid the ambiguities associated with this term by describing the subjects studied in terms of the incomes of their families. An attempt was also made to study, primarily, children of the cultural majority so that any effects of social discrimination would be minimized. The study focused, therefore, on economic disadvantage. However, the concept of economic disadvantage is also a global one which masks a wide range of conditions which may affect children in different ways.

Poverty, in itself, may not be harmful to children whose parents are stable, are concerned about their children's welfare and are reasonably competent as individuals. In fact, poverty may provide healthy challenges for the growth of children, as many of those who grew up during the Great Depression of the 1930s have pointed out. The damage to children appears to result more from the effects of poverty on the parents, which cause marital conflict, marriage breakdown, alcoholism and violence, than from poverty itself. Single parents with limited incomes face special difficulties in coping with the demands of everyday living and in meeting the emotional needs of their children, but single parents, as well as intact families, vary widely. The problems of the unmarried mother, especially if she is very young, differ from those of the more mature mother who is separated, divorced or widowed. The number of children she has makes a difference as does the extent to which the unmarried mother is alone, or is supported or handicapped in meeting the demands of parenthood by an extended family. There are many degrees of poverty and these are not always related to the size of the family's income, and being in poverty may be either chronic or intermittent. Some parents are poor because they start families as teenagers before they have developed any marketable skills; some because of chronic illness or depression which deprives them of the motivation to work. Others are simply unable to find regular employment or have difficulty, for a variety of reasons, keeping a job.

Children in the samples studied in this project were from families that differed in all of the above respects and more. Some of the children were abused by their parents and others were neglected. Some, because of family breakdown, became wards of the Children's Aid during the project and experienced several different foster home placements. Most were at least mildly disturbed emotionally. However, a few were from relatively stable homes and appeared to be receiving adequate care. Thus, the individual needs of these children varied widely.

The Cause of Concern

The concern for children from low-income families derives from the fact that they fail in school more frequently than do children from more affluent homes. This has been known for a long time (Anastasi, 1968) and is well documented. There is, however, little agreement about why. Some have attributed their failures to a lack of ability, but more have rejected this hypothesis and have suggested a variety of other possible causes.

Some say that low-income children lack the motivation to learn (Zigler & Butterfield, 1968). Since it has been found that the curiosity and exploratory drives of young children can be enhanced or reduced by the quality, amount and variety of the play materials available to them (Yarrow, Rubenstein, Pederson & Jakowski, 1972) then, if low-income children are not offered a stimulating array of responsive materials in their homes, their efforts to affect their environments may not be reinforced. As a result, their natural impulse to explore and learn may be diminished. The need for achievement has been found to be positively related to socio-economic status (Douvan, 1966; Atkinson & Feather, 1966; Veroff, 1969) and it has been suggested that lower-class parents are less likely to provide the role models needed to develop in their children the desire to achieve. However, others have found that the majority of lower-class parents are ambitious for their children and want them to advance in school (Kelier, 1963). Zigler and DeLavry (1962) found that the children of the poor put forth more effort in learning laboratory tasks for tangible rewards, such as candy, than for intangible rewards such as commendation, and that the children of the more affluent put forth more effort for praise or for being told they were right. However, these findings may have reflected only differences in the amount of value attached to the material rewards (Tajfel, 1957) rather than to differences in the desire to master the skill.

Others have argued that the problems of low-income children lie in their lack of self-esteem. Children in poverty have been found to have low self-esteem (Dreger & Miller, 1960; Hawk, 1967) or little self-confidence, a characteristic attributed to conditions such as discrimination, repeated failures and autocratic parental management styles. They have been found to have little feeling of responsibility for what happens to them (Battle & Rotter, 1963; Crandall, Katkowsky & Crandall,

1965) believing that the locus of control is outside, rather than inside themselves and that personal efforts to change their lot would be fruitless.

Maladaptive social behavior has also been suggested as a reason for low levels of achievement in school. Lower-class children have been found to be more likely than middle-class children to reject authority and to lack self-control, a tendency which is attributed to the more power-assertive, harsh and inconsistent disciplinary measures used by their parents (Bronfenbrenner, 1958; Becker, 1964). Lower-class children have also been found to be more aggressive than middle-class children (McKee & Leader, 1955) perhaps because this characteristic is rewarded in urban slums (Lesser, 1959) or because lower-class parents provide aggressive role models for their children and encourage and reward aggression (Davis & Havighurst, 1947). Davis (1972) reported that low-income boys without a consistent father-figure before the age of four years tended to be over-dependent on adults and that this adversely affected the development of satisfactory peer relations, sex-appropriate behavior and competitiveness. However, Hartup (1963) and Bandura and Walters (1963) pointed out that extreme neglect and autocratic disciplinary techniques can eliminate dependency responses, and some lower-class children have been found to exhibit more independence than their middle-class counterparts (Foster, 1966).

More recently, however, evidence has been accumulating which suggests that the cause of the school failures of low-income children lies not in their personal and social characteristics, but in their cognitive styles and strategies which prevent them from utilizing their intellectual potential effectively. It has been found that they have difficulty processing information in representational or symbolic form (Sigel, 1971; Hunt, 1972) and that although their concrete intelligence is adequate, their abstract and conceptual intelligence is not (Jensen, 1969).

Their difficulties in this area are thought to be due to the circumstances under which these children are raised from conception until they enter school (Hunt, 1972). These include a lack of order in the home, such as regular mealtimes, which deprives children of the conditions under which they can develop rudimentary concepts of time, and, as well, over-crowding, noise and confusion (Deutsch, 1964) which may discourage discrimination of sensory stimuli and attentiveness to human vocalization (Clark & Richards, 1966). Parents in poverty have been found to spend less time in verbal interactions with their children than do middle-class parents (Keller, 1963) and to communicate with them in shorter sentences (Deutsch, 1964). Thus, they are less likely than middle-class parents to have conversations with their children that encourage thinking and the manipulation of ideas. Furthermore, they are likely to discourage and even punish their children's efforts at inquiry for these are viewed as a threat to authority (Bernstein, 1967). Hunt (1972) concludes that the talk of the lower-class parent tends to concern "what is present in limited space and known to all and is highly lacking in what calls upon the child to abstract and learn the names for such aspects of objects as their color, their shape, their size in relation to other objects, their position with relation to other objects, causal explanations, and conceptions of such things as space and time" (p. 310).

Books, pictures and other representational materials are likely to appear less frequently in the homes of the poor than the affluent. Lower-class parents are less likely to read to their children, tell them stories, show them pictures, play "pretend" games with them and in many other ways encourage imaginative symbolic activity than are middle-class parents. These differences in stimulation may help to account for the findings of Sigel (1971). He reported that school-age children in poverty were able to classify *concrete* objects in a way that resembled the classifications of middle-class children, but their classifications of *pictures* of the objects or *names* of the objects differed radically. It appeared the experiences of the children in poverty had failed to make them able to deal effectively with the objects when they were in representational form.

Other cognitive areas in which social class differences have been found include cognitive tempo or reflection-impulsivity as defined by Kagan (1965). The children of the poor show less "reflective" delay in responding to a discrimination task and make more errors than middle-class children, suggesting that they do less internal information processing before making a response. The tendency to be "reflective" on Kagan's Matching Familiar Figures Test (MFF) has been found to be positively correlated with measures of intellectual ability and reading achievement (Kagan, 1965). The imaginative capacity of the economically disadvantaged child has also been found to be relatively low (Ames & August, 1966). Weikart, Rogers, Adcock and McClelland (1971) reported that some Head Start children did not role play and needed to be led into this kind of activity by the teacher.

Intelligence tests are generally considered to be a measure of learning ability, but it has been found that lower- and middle-class groups, who differ in their performance on such tests, do not differ markedly in their ability to perform on laboratory learning tasks such as selective trial and error learning and paired associate learning (Stodolsky & Lesser, 1967). While the correlation between tested intelligence and performance on these kinds of learning tasks was found to be high for the upper-status groups, it was negligible for the lower-status groups. These findings suggest that some types of learning ability in lower-class children are not adequately reflected in general intelligence tests. They also suggest that the lower-class child's difficulty in performing on the intelligence tests is due to an inability to meet the representational demands of the tests, to recognize relationships between past learning and present problems and to apply knowledge effectively.

In summary, many reasons have been offered for why children from low-income families are more likely to fail in school than are children from more prosperous families. It has been said that they are less highly motivated to learn; less confident of their ability to affect their destinies; less well adjusted socially; less self-controlled and more resistent to authority; and less capable of utilizing their intellectual potential because of their poorly developed representational skills and their inefficient cognitive styles.

These suggestions determined the principal areas in which the low-income children were assessed in our project. They also determined the basic objectives of the preschool program which was developed for them.

Needs of Low-Income Children

Compensatory education means, by definition, that such education compensates or "makes up" for something that is lacking in a child's environment,which is needed to help that child realize his or her potential. The first step in our study, then, was to identify the nature of that lack. What did children from impoverished homes need that they were not being given?

The initial attempt to answer this question was made not only through the study of the literature reviewed above but through observations and assessments of the subjects in the project during the first project year. The subjects included children from both low-income and high-income families. Our first impressions were that the low-income children were just as motivated to learn and just about as competent socially with their peers as were the high-income children, but were less self-controlled, less conforming, less task-oriented and more impulsive. Also, the test results suggested that the largest differences between the low- and the high-income children were in the conceptual or cognitive areas. We concluded, therefore, that what these children needed was help in improving their self-management skills, their problem-solving and cognitive styles and strategies, and, above all, their representational skills and conceptual abilities.

Basic Assumptions

The basic assumption on which the program was built was that children aged three to five years are at a critical stage in their cognitive development, during which they are making the transition from the manipulation of the concrete to the abstract, and that, if adequate support for the development of efficient symbolic functioning is not provided during these years, it will be extremely difficult to activate it at a later stage. It was assumed that in low-income families, in which the cognitive abilities and interests of the parents are typically under-developed, the children receive inadequate cognitive stimulation at this critical time in their lives and that this is the basic cause of their later failures in school.

One of the most striking indications that the acquisition of representational skills is an important developmental task for three- and four-year-olds is the extent to which they spontaneously engage in imaginative or make-believe play. In essence, such play reflects their efforts to exercise their new capacities for thought or for the manipulation of objects, relations and events, which are not immediately present, in a symbolic or representational form. It is during these years that children begin to be able to make-believe, to pretend that an object is something different from what it is and to act out ideas without the aid of props (Elder & Pederson, 1978).

Implications for Program Planning

The conclusion that the program should attempt, in every way possible, to activate "thinking" in all its various forms and provide a maximum amount of stage-related cognitive challenge had many important implications for its design. In brief, these were as follows:

1. It was considered more important to have the children try to "figure things out" than to give them the right answer. Hence *inquiry* (what, how and why) was the teaching mode and *experimenting*,the instructional method.
2. Experiencing the joy in discovery and the satisfaction in mastering a challenging problem was considered more important than how much "correct" knowledge was acquired. Therefore an *active-discovery*, play-oriented type of program was developed in which self-selected exploratory activities were induced through the manipulation of attention-inducing and attention-maintaining variables such as novelty, variety, discrepancy and ambiguity.

   Most of the available time, although not all of it, was devoted to child-selected activities. A sense of accomplishment was induced in the children and their interest was maintained by *commending* improvements in their performance, rather than praising them or rewarding them in tangible ways. *Commendation* points out what the child has accomplished, it attributes success to the child's own efforts, and it attributes the child's efforts to the pursuit of his or her own goals rather than to the goals of others, such as teachers.

3. Helping the children develop an *"inner" locus of control* (i.e., helping them discover that they could determine their own destinies by using reason, foresight and good judgment) was considered more important than shaping their behavior by external control and manipulation. Since it is possible to control outcomes only if they are predictable, care was taken to develop an objective, non-authoritarian, instructional, reasoned approach to the management of behavior and to establish a consistent set of requirements and consequences which were logical and easily understood by the children. Adapting to the requirements of the preschool was thus turned into an exercise in cognitive functioning. The children were helped to think ahead, to make predictions and to choose between behavioral options in terms of those predictions.
4. Helping the children discover the joy in *socializing* was considered important, not just for its own sake, but because of the cognitive challenges which participation in social activities provide. Playing with others presents many problems, the resolution of which depends on the ability to communicate, or to send and receive a language code, to interpret and understand the thoughts and feelings of others and to take these thoughts and feelings into account in resolving disputes or achieving social goals. Playmates are intrinsically fascinating. They are unpredictable, their behavior is varied, surprising and novel and their points-of-view are often discrepant from one's own. In short, they are interesting and puzzling and, as such, create optimum conditions for generating problem-solving thought. Among the special methods used to exploit the possibilities in social play for cognitive development was the stimulation, in a systematic way, of theme-oriented, socio-dramatic play. Some of the play was reality-oriented (acting out episodes in play centers, such as a medical center, which were well-equipped with props) and some, fantasy-oriented (acting out stories with a make-believe theme using no props or "pretend" props and sometimes puppets). Teacher guidance in small groups was used to help the children develop themes and act them out, but the development of appropriate centers in the playroom set the stage for the transfer of this type of representational behavior into the children's self-initiated play activities, where more assimilation and real growth were expected to occur.
5. Making *plans* and being resourceful and *creative* in using materials for constructive purposes to achieve self-selected goals was considered more important than simply copying a model or following instructions. The goal was to encourage the child to

develop ideas and then to implement those ideas in a purposeful way.

6. Finally, developing *trust in adults* and the ability to relate to them in instructional situations was considered of major importance. The children were therefore exposed to the more intimate type of cognitive stimulation which most middle-class parents offer their youngsters in one-to-one, face-to-face situations, or in small family groups (e.g., playing games). To accomplish this, each teacher assumed responsibility for working with specific children over specified time periods, during which the focus was on the achievement of particular cognitive goals. The teacher's task was to assess the developmental level of each of her children and then involve them in problem-solving activities either individually, or in small groups, which would be challenging, but not so difficult as to be discouraging. The activities varied. They included experimenting, using recipes to prepare food and playing games of various sorts, including some highly active gymnastic ones. The curriculum aims of these sessions were to help the children develop relational ideas pertaining to number, quantity, seriation, location, direction, classification and transformation of substance.

A detailed description of the objectives and implementation of the program is provided in the following chapters.

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2

The Preschool and the Program

The University of Western Ontario (UWO) Laboratory Preschool is located on campus in the Social Science Center. It is administered by the Department of Psychology and is located on the fifth floor of the Department's nine-story laboratory tower. In addition to the preschool, there is on this floor a bank of research rooms equipped for studies of infants and young children. The preschool was established to provide facilities for research and instruction in the fields of child development and early childhood education. The preschool staff was expected to develop a model program, based on current theory and research, which could be used for demonstration purposes and training at both the undergraduate and graduate levels.

The decision to include a preschool in the Department of Psychology's new laboratories was made before the building in which it was to be housed was built. Hence there was time to design the preschool with care and this was done with the help of an architect, experienced in the design of facilities for young children, who was retained by the Nurseries Branch of the Ontario Ministry of Community and Social Services.

THE PRESCHOOL

Physical Facilities

The physical facilities include both indoor and outdoor areas. The overall design and dimensions of these areas are shown in Diagram 1. Indoors there are a large main playroom with a fully equipped kitchen; a smaller playroom which also serves, at the beginning of each session, as

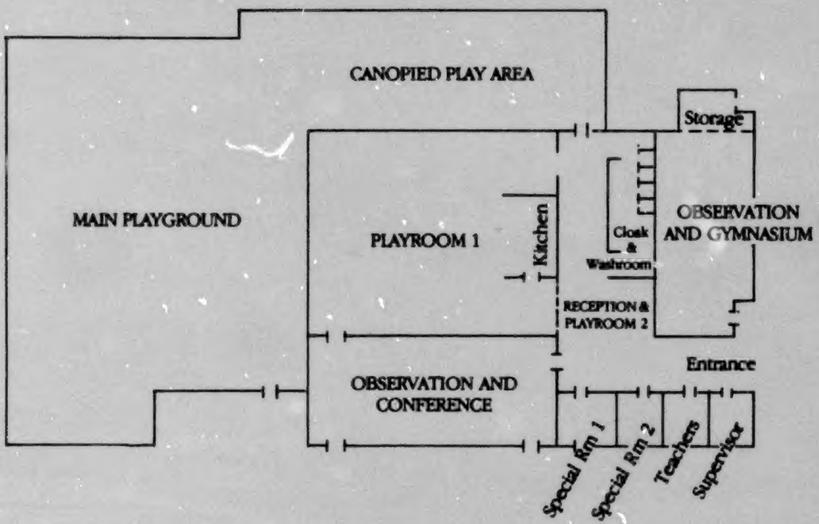


Diagram 1

Overall Design of the Preschool Environment

a reception area; a large combined cloakroom and washroom; and two small special project rooms. Observation rooms equipped with one-way-vision mirrors and microphones for auditory monitoring of the children's activities provide facilities for observing all indoor areas of the preschool. One of these observation rooms is also equipped as a gymnasium for use by the children during inclement weather. Outdoors there is a roof garden, directly accessible from the preschool, which is equipped as an adventure playground. Part of the playground is canopied so that it can be used on rainy days.

The Children

The preschool serves two groups of children, one in the morning from 9:00-11:30 a.m. and the other in the afternoon from 1:00-3:30 p.m., five days a week (excluding holidays) from mid-September to mid-June. Each group is approximately balanced for sex and is heterogeneous for age. At intake, the age range is 2 years, 10 months to 4 years, 8 months.

During the project the socio-economic status of the children in each group was mixed. Most were from families with middle to high incomes who paid fees and of these, about half were from the university and the other half from the non-university community. The number of low-income children who were enrolled in each group varied from year to year as described below.

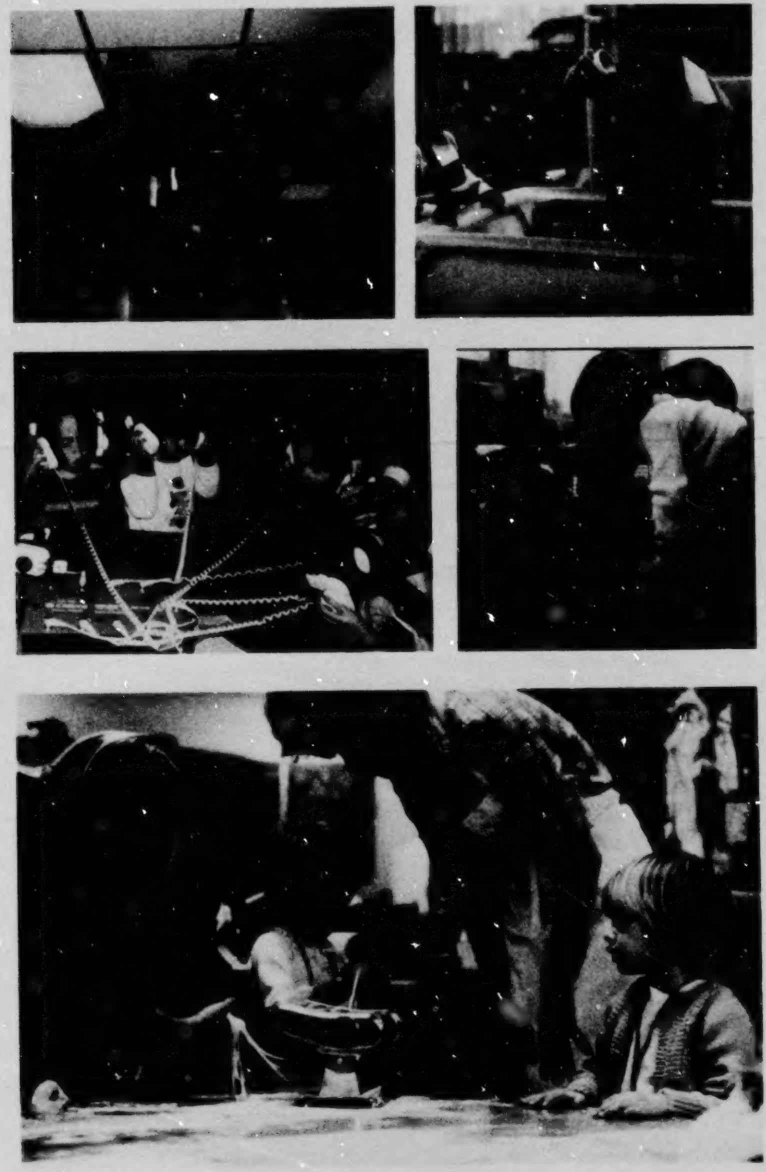
In the first project year, the number of children in each group was 25. This number was increased to 27 in the second year and to 28 in the third year, and was then held constant. The ratio of low- to high-income children was increased from the first to the fourth project year and then decreased in the fifth year as follows: In the first project year there were 5 low-income and 20 high-income children in each group (ratio of 1:4); in the second there were 8 low-income and 19 high-income children in the morning group (ratio l:2.4) and 7 low-income and 20 high-income children in the afternoon group (ratio 1:2.9); in the third and fourth years there were 10 low-income children and 18 high-income children in each group (ratio 1:1.8); in the fifth year there were only 5 low-income children, but all were in the afternoon group with 23 high-income children (ratio 1:4.6).

The Teaching Staff

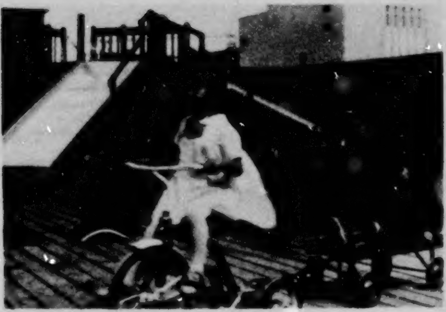
The staff of the preschool consisted of four full-time teachers, a supply teacher and the director. One of the four teachers was the supervisor of the school and another was the first assistant. The director was a member of the academic staff in psychology (the writer). The teacher-to-child ratios were, therefore, 1 to 6.3 in the first, 1 to 6.8 in the second and 1 to 7.0 in the third, fourth and fifth project years.

Throughout the duration of the project there was little staff turnover. At the end of the first year the most junior member of the staff resigned and was replaced. In the fourth year two of the original teachers worked half time and a new teacher was added. In the fifth year there was a new supervisor. Note, therefore, that during the first four years, when close to 90% of the subjects in the project attended the preschool, the key members of the teaching staff were the same.

The teachers were selected carefully on the basis of their academic achievements, their warmth with children, their spontaneity as teachers, their capacity to change in response to new ideas, and their ability to function efficiently as a member of a team. They were all young teachers with no more than a year of teaching experience. The supervisor had an M.A. degree and was pursuing part-time doctoral studies. The first assistant was doing some part-time study at the graduate level and the other teachers had B.A. degrees. All had received professional training in early childhood education. Thus they were all able to function as full participants on the program development team which met weekly with the director to review scientific literature and develop innovative ideas for teaching practice.



The University of Western Ontario Laboratory Preschool
London, Canada



Preliminary Planning

The director was appointed and the supervisor selected one year before the preschool was opened. These two had, therefore, time to confer and reach agreement on many issues regarding the type of program which would be offered. They also worked together on the selection of the rest of the staff.

During the summer, prior to the opening of the school, preliminary meetings with the teaching staff were held. These meetings enabled everyone concerned to make suggestions about any additional equipment needed and about how to utilize and organize the available space. The program was also discussed and the teachers were given psychological literature on cognitive development and educational literature on cognitive-developmental programs to study.

In September, during the first two weeks before the children were enrolled, the teachers participated in a "crash" series of seminars and discussions on the goals of the program and some of the ways in which the goals might be achieved. The principles of child management were also carefully reviewed and final decisions were made about the utilization of time and space and the ways in which the staff would be organized and deployed.

Continuous Planning

During the first project year both informal and formal planning sessions were held almost daily. In subsequent years a routine for planning was established. Full-day planning sessions were held three times a year, in September, November and March, during which master plans were made for the fall, winter and spring terms. Two kinds of after-school planning sessions were held weekly: one for program development and one to deal with the details of the day-to-day implementation of the program. Special meetings were scheduled to review the children's developmental levels; major ones were held early in December.

The program which will now be described was not fully implemented until the third project year. However, this was the year when the largest number of low-income children were enrolled. How the program differed in the first and second years is described in Chapter 6 along with the reasons for the changes. There were no changes in the philosophy and general educational approach to the children during the project, but some of the strategies for achieving the objectives were modified.

THE PROGRAM

Theoretical Base

The program was based on cognitive-developmental theory (Kohlberg, 1968). We were influenced by the thought and work of earlier leaders in this tradition: John Dewey (1943, 1945), W. E. Blatz (1944, 1966, Wright, 1974), Jean Piaget (1952, 1963), as well as its more contemporary proponents.

In planning the practical details of the program, at least in the early stages, we considered ideas drawn from the literature on more informal programs (Nimnicht, Meier, & McAfee, 1969; Weber, 1971; Moore & Kilmer, 1973), especially Piagetian ones (Lavatelli, 1973; Weikart, Rogers, Adcock, & McClelland, 1971; Kamii, 1972), but paid most attention to the work of Weikart and his group. This was because there was some evidence, although modest, that their program for disadvantaged children was producing enduring as well as immediate improvements in cognitive and intellectual functioning.

The theoretical position adopted makes basic assumptions about children as follows:

1. They are active, rather than passive. They participate in transactions with their environment. They are influenced by experience, but they themselves play a part in shaping that experience. Thus, they cannot be manipulated into a pre-planned pattern.
2. Their behavior is determined by cognitive variables, such as perceptions and expectations about self, others and the physical world, that influence and largely determine their motives and emotions.
3. As their knowledge of the nature of the universe of people, objects and events increases, and their ability to comprehend causal and other kinds of relations improves, the accuracy of their perceptions and predictions increases and their selection of goals and goal-directed activities becomes more appropriate.
4. If the universe in which they function is stable enough to be predictable, their efficiency in controlling outcomes increases rapidly and they develop confidence in their ability to achieve desired goals.
5. They proceed in their growth through developmental stages which set limits to their capacity for understanding and change, but they proceed through these levels at different rates and in unique ways.

6. They are by nature problem-solvers. They are "intrinsically" motivated to attend to, explore, experiment with, and produce effects on their environment. Producing such effects is the most powerful reinforcer of effort. They seek sensory stimulation and are alerted and challenged by novelty (discrepancy and ambiguity), surprise (the unexpected), change and variety. These conditions induce mild anxiety and striving for understanding. Material "extrinsic" rewards are not required to induce exploratory behavior, and may even discourage it, but a responsive environment in which children can produce effects is required to maintain the tendency to explore.
7. They can be helped to learn, but cannot be taught. They must be interested and involved in an experience if they are to be changed by it. The teacher's task is to induce such involvement in activities that are likely to produce growth.
8. They learn more by "doing" than by being told or shown what to do, for in the "doing" they are actively involved.

Program Model

The assumptions made above led us to develop an individualized, active-discovery type of program. The program was play-oriented, rather than work-oriented. The children were "drawn into" activities aimed at attaining the objectives of the program. Their involvement was obtained through the use of novelty, variety and change. The activities in which the children engaged were self-selected, but the activities available for them to choose were all ones which were expected to be productive of the desired types of growth. Everything was planned to give the children the maximum amount of freedom to be independent agents in a familiar, predictable environment in which they could make plans, carry them out, and discover their capacities for mastery and for producing effects.

This type of model was chosen not just on theoretical but on empirical grounds. As was stated earlier, there was some evidence which suggested that an individualized, cognitively oriented program might produce enduring benefits for low-income children (Weikart, 1971) and there was a substantial amount of evidence that a more formal program might not. Highly structured programs, which utilized direct instruction, were known to produce the most impressive immediate IQ and academic gains in the preschool (Englemann, 1970) but these gains were quickly lost in the primary grades (Weikart, 1971; Bronfenbrenner, 1974). The formal teaching methods appeared to induce dependency on teacher direction and reinforcement, rather than a propensity in the child for acquiring knowlege.

Objectives of the Program

The objectives of the program were comprehensive. They included goals related to the personal, social and physical development of the children, as well as goals related to their cognitive and intellectual development. This was based on the assumptions that children function as integrated wholes; that their perceptions of self and others and the feelings these engender influence their ability to think and to learn; and that their levels of thought and capacities for understanding influence their emotional and social development.

The objectives were considered in long-range as well as short-term goals. For example, the attainment of unthinking obedience to authority in the preschool was *not* an immediate objective, because this was considered poor preparation for survival in a democratic society in which there would be multiple authorities. Thus, the immediate goal of the plan used to manage behavior was to induce critical thinking, to achieve conformity based on the child's conclusions about the credibility of the authority and his or her predictions about the outcomes of behavioral alternatives. This put the locus of control squarely on the child.

The *personal-social and physical goals* were as follows:

(a) to enhance the children's self-respect, self-esteem, sense of personal worth and self-confidence. Children who feel likeable and expect to be accepted are positive in their approach to others and are likely to receive a positive response. Children who are self-confident expect to be successful if they expend sufficient effort. Therefore, they try and they persist.

(b) to develop in the children trust in knowledgeable, responsible adult authority figures such as their teachers. Good feelings and attitudes developed toward one's first teachers tend to "carry over" and influence, in a positive way, expectancies and relationships with future teachers.

(c) to help the children develop self-management skills, self-control and a sense of responsibility; discover that what happens to them is determined more by their own decisions and actions than by the actions of others; acquire the view that they are in charge of their own destiny if they think ahead; develop a sense of security about their ability to cope with consequences so that they will have the courage to make decisions and to take calculated risks.

(d) to help the children discover the joys to be found in companionship with peers and to acquire an awareness of, and sensitivity to, the needs, perspectives and rights of others that will induce in them consideration of others and the ability to cooperate.

(e) to help the children discover the special sensory pleasures to be enjoyed in artistic activities (music, painting, molding plastic materials, expressive movement in dance), in athletic activities (climbing, jumping, balancing), and in utilizing fine motor skills (cutting, pasting, drawing, threading) and acquiring eye-hand and large-muscle coordination.

Some of the immediate behavioral objectives associated with these goals were as follows:

- is open, spontaneous, friendly with teachers and peers
- is self-directed, makes choices among play options independently
- makes plans, organizes materials to carry out plans independently
- meets challenges by putting forth effort
- seeks help from adults when needed,without anxiety
- listens to adults, but may not follow their suggestions
- usually conforms to the limits of the school
- occasionally tests limits, but accepts consequences without complaint
- usually carries out small tasks when asked
- shows interest in peers and seeks their attention
- uses positive approach in interacting with peers
- is considerate of peers; listens to them, avoids interrupting them
- can obtain attention and help from peers and provides some leadership
- plays cooperatively with peers, can and will follow as well as lead
- performs motor skills involved in self-care (dressing, washing, etc.)
- achieves eye-hand coordination in cutting, pasting, drawing, pouring, threading, hammering, balancing objects, etc.
- achieves large muscle coordination in climbing, maneuvering wagons and tricycles, balancing, running, skipping
- displays a realistic sense of physical capacities (i.e., is adventurous, but not foolhardy)
- shows an awareness of the physical environment and makes appropriate judgments (avoids accidents)
- participates in and enjoys music, dance, painting, making things and using fine motor skills.

The *cognitive and intellectual goals* were as follows:

(a) to help the children develop the ability to use their intelligence: "learn how to learn," develop an inquiring mind, mastery motivation, efficient cognitive styles and the ability to relate past experience to new situations in a problem-solving task.

(b) to help the children develop their cognitive and intellectual abilities: process information in representational form using images, words, ideas and concepts; deal with representations of objects; develop some understanding of relational concepts and how to use them in the organization of their knowledge; develop language competence and the desire to read and write.

(c) to help the children expand their knowledge of cause and effect relationships in the non-social as well as the social world: how plants and animals live, grow and change; how substances are transformed by, for example, the application of heat; why wagons run off *down* the hill; the nature and functions of air; the behavior of water; the meaning of weight and so forth.

Some of the immediate behavioral objectives associated with these goals were as follows:

- wonders about, inquires about, explores to learn about people and the roles they play, animal life and plants and how they grow, the seasons and why they change, the physical world and the nature of its properties (i.e., asks how, what and why questions)
- experiments: considers cause and effect relations, makes predictions and tests them
- observes carefully (reflective), identifies distinguishing features of objects and recognizes similarities and differences
- tolerates ambiguity and is challenged by it
- tackles problems, puts forth effort, shows persistence
- purposeful in play; makes plans and carries them out
- maintains sustained attention to a task
- imaginative: pretends, makes believe, acts out events in representational form and can role play
- creative: flexible and resourceful in approach to problems
- has some ability to classify objects and representations of objects in terms of their commonalities
- has some ability to seriate, or order, objects in a series (e.g., by size)
- has some understanding of spatial relations and is able to use some directional and locative terms appropriately
- has some simple notions about temporal relations such as before and after
- counts, recognizes numerals and has grasped some simple number concepts

- uses language as a representational skill, speaks freely and fluently and is able to communicate wants and ideas
- uses books in free play; shows interest in learning to read and write; recognizes some words and some letters.

Strategies for Achieving the Objectives

An individualized, active-discovery, cognitively oriented program is not without structure. Since the children function independently, all aspects of the program must be carefully planned and organized. The physical space must be designed so that it produces behavior that is conducive to individual growth and development. The staff must be highly organized and their duties synchronized so that the flow of events runs smoothly. The use of time must be planned over the whole year in terms of the major objectives; over broad blocks of time so that educationally related events occur in the right sequence; over shorter periods as the curriculum content is introduced; and on a daily basis with respect to the specific activities that will be pursued, especially in the teacher-guided aspects of the program. Time must also be found for giving the children individual attention, for assessing their cognitive abilities and for providing them with experiences which are tailored to their special needs.

Organization of Space

The play areas were designed to help produce a relaxed, tension-free atmosphere in which the children could feel secure and unpressured and in which they could function freely and spontaneously.

Both the indoor and outdoor areas were organized into play centers. Each center was equipped to encourage specific types of activities and provide specific types of experience. Each center was spacious enough to accommodate an appropriate number of children for the activities that would be pursued, without overcrowding. These centers had the effect of sorting the children out into small groups, which were less overpowering for the younger ones and not too stimulating or distracting for the older ones.

In the main playroom the centers were arranged along the walls of the room and were all open and visible to the children. There was a clear path through which the children could move freely from one center to the other. Part of this path was large enough for group activities. The overall organization of the main indoor playroom is shown in Diagram 2.

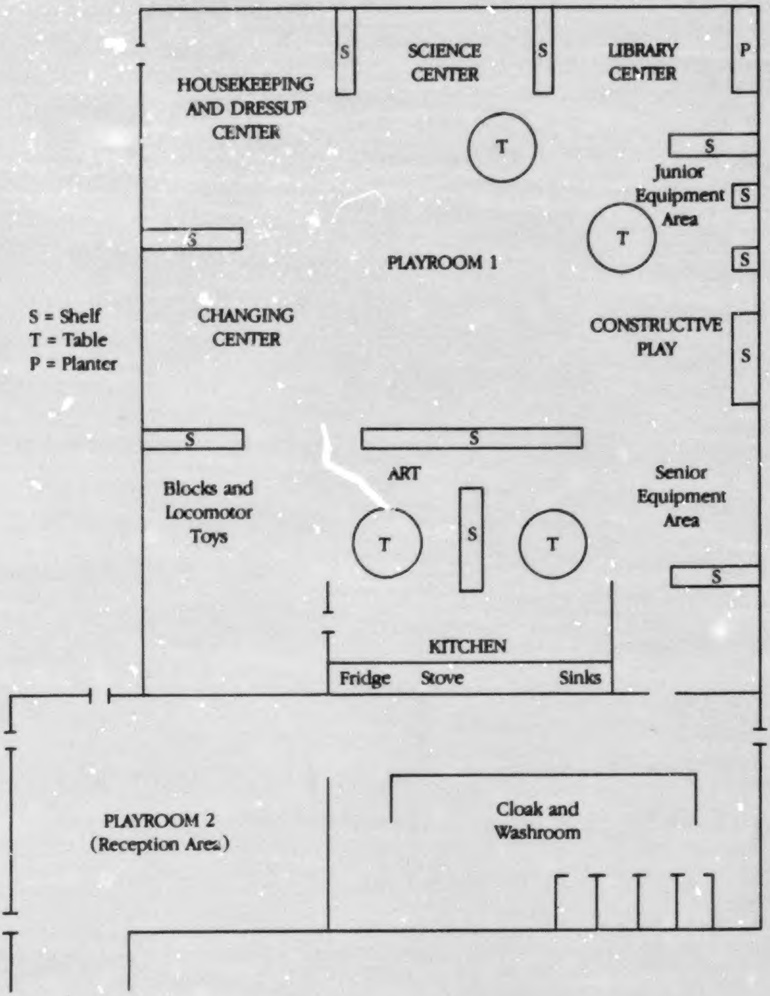


Diagram 2

Organization of Space and Location of Learning Centers in the Main Playroom (PLAYROOM 1).

The children arrived in the playroom from the cloakroom through only one door and this ushered them into an area where the centers directly to their right and left [illegible] ones that were conducive to more private, quiet, task-oriented play ([illegible], 1963; Kritchevsky, Prescott & Walling, 1969). The center on their right provided units of equipment, presented in boxes, on open shelves. The children could select a box of equipment and play with it on either the floor or a table. Some of the equipment in the boxes was structured, self-correcting and self-pacing. This equipment was sorted by difficulty. Equipment suitable for the youngest children was located at one end of the area, and more difficult materials were located at the other end. However, most of the materials in the boxes were plastic and both younger and older children could use them successfully for both constructive and creative play.

The center on their left was the art and handicraft center where the children could cut, paste, paint, draw and the like, and a teacher was always located there. If the children passed on beyond these centers, the next two encountered were the book center (a cozy corner equipped with floor cushions, many books and a tape recorder) and the science center (equipped differently at different times, but always with some fish or animals and always with something novel). These four centers were permanent ones and were available throughout the whole academic year.

Centers that induced more social play were located on the side of the room opposite the one in which the children arrived. These included two permanent centers, one for housekeeping and the other for block play, and a "change" center. The "change" center was an area in which a variety of different kinds of novel centers were set up during the year, each for two or three weeks. Novel dramatic play centers were established there (e.g., a doctor's office, restaurant and the like) or a puppet theater, but at other times it might become a "number" center. Whatever went into this area was noted by the children and it was therefore used to draw their attention to new equipment and sometimes to equipment which they infrequently used.[1]

Note that the location of the centers, relative to where the children arrived in the playroom, was deliberately planned to induce more private, task-oriented play rather than more active social play, so that a serene atmosphere would be induced at the beginning of the program which would, hopefully, set the tone for the day.

The smaller playroom doubled as a reception area and the wide folding doors between it and the main playroom were not opened until all of the children had arrived. This was a multipurpose room and was not organized into centers. It was always used as a whole for only one type of activity. It contained a piano and was used for group activities. In the cold winter months, when large block and board construction could not be done outside, it was turned into a large block area. At other times it became, for example, a music room available for free play.

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[1] All shelves and dividers were movable. As the program developed, the permanent centers were temporarily reduced in size to provide space for other special centers.

The outdoor adventure playground was divided into zones or play areas in which specific types of activities could be pursued. It provided the following:

1. A long, double-lane miniature highway which went up a ramp and then became a single-lane, one-way road. Children going up the ramp turned right and followed the road along a circular route which led back to the ramp where they went down again onto the two-way highway.
2. A large gymnastic area equipped with a custom built, high level, complex apparatus on which the children could slide, walk over bridges, climb on rope ladders, hang on bars and swing.
3. A large building area equipped with a frame house, boards, large blocks and pulleys.
4. A large step-in sand box and an associated water tank, the latter for use in warm weather.
5. A carpentry center, also used in only the fall and spring.

In addition to the equipment mentioned above, there were wagons and tricycles, a rocker boat and teeter-totter, a tumbling mat, vehicle service equipment (e.g., gas pump), a round house, a tunnel, planter boxes, small benches for intimate conversations, and a picnic table. In the winter, when there was snow, sleighs and toboggans replaced the wagons and tricycles, and other "winter" equipment was added. The design of the playground is shown in Diagram 3.

Organization of Time

The whole preschool program year was preplanned in terms of the major objectives, with the focus shifting at specific times to meet various goals. During the first six weeks of program operation, for example, the focus was on the social and personal goals. During this period the environment was simplified; only the major permanent centers were provided and these were equipped modestly as compared with later on in the year. There was enough novelty in this environment to interest and challenge the children and not so much that it confused them and made choices difficult. This was a time to just have fun; for the teachers and children to get to know each other personally and feel comfortable together; and for the children to become familiar with the school and feel at home there. During the first four weeks, the program day began on the playground, and the outdoor play period was extended because

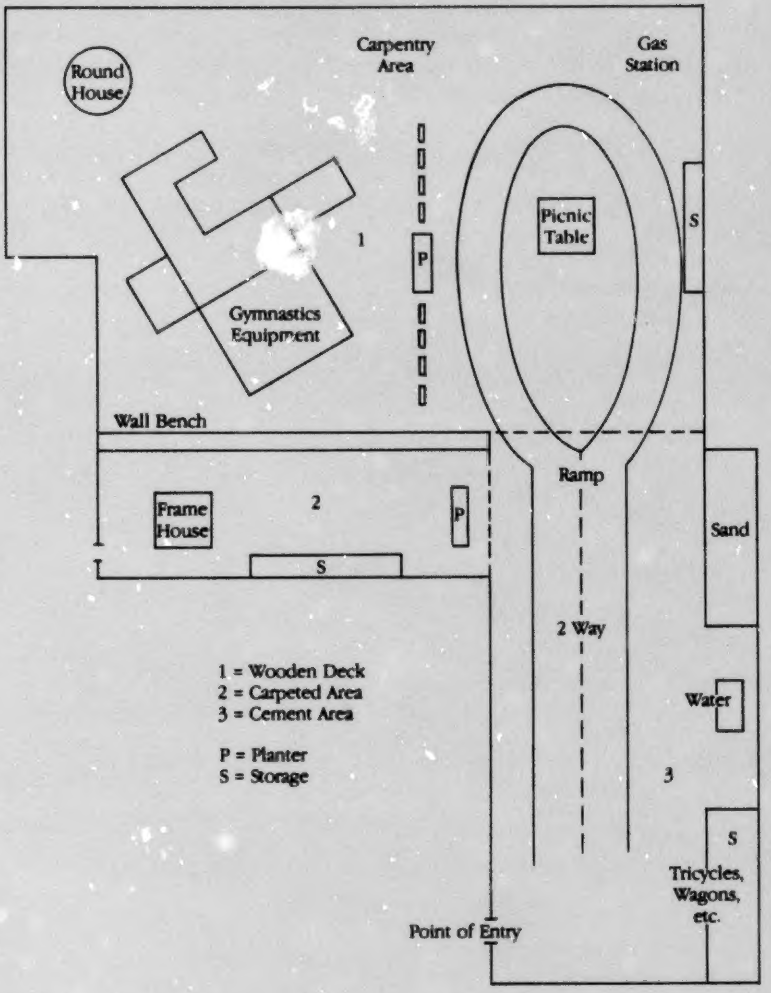

Diagram 3

Design of the Playground—Roof Garden

there was more opportunity on the playground for active play and fewer requirements. During the shortened indoor play period the children were gradually taught the "limits." This adjustment period was also a time when the teaching of self-care routines was an important curriculum area. Learning about their cupboards and how to use them and acquiring the ability to wash, toilet and dress were challenging tasks for the younger children, and more teacher time than later had to be spent with them in the washroom. To facilitate rapid acquisition of these skills, the teachers instructed the children to follow a simple step-by-step procedure which got the jobs done in the shortest possible time and with the least frustration. The routine for washing is described in Appendix A to this chapter (see Basic Limits and Requirements).

During the last two weeks of this preliminary adjustment period the daily timetable for the rest of the year was established and by the end of this two-week period most of the children were well "settled in." It was then about the first of November and time to individualize the program in the cognitive areas. Consequently, the children in each class (morning and afternoon) were divided into four sub-groups of approximately seven children, and each of the four teachers assumed responsibility for one of these sub-groups. The teacher's principal task was to work with each of the children in his or her sub-group individually, assess their developmental levels and begin individualized cognitive stimulation programs with them which were tailored to their needs. The assessments were done in November and the stimulation programs began in January. After the children were assessed they were sometimes re-grouped so that they could be worked with in small groups of two or three.

The focus of the program in the cognitive areas was on "number" in January, shifted to "classification" in mid-February and shifted to "spatial relations" in mid-March. Of course, functioning in all of these areas is interrelated and many of the activities in which the teachers involved the youngsters provided experiences in all of them. This part of the program was aimed at improving the children's language skills and their cognitive styles, as well as at increasing their representational and conceptual abilities. It was also aimed at helping the children become more comfortable with adults in a face-to-face problem-solving situation.

The master schedule. During the full-day planning sessions held before the beginning of each term, a master plan was drawn up. This schedule covered the following: field trips and visitors, the preparation of the children for these events and follow-up activities such as special projects or special centers; the establishment of novel centers for dramatic play and other types of play related more specifically to the cognitive goals; the introduction of equipment in the science and other permanent centers; and the content to be stressed when the children were engaged in large-group activities (the traditional circle). Weekly planning was then done in conjunction with this master plan.

The daily schedule. There was a regular sequential pattern to the array of activities offered the children each day. A copy of the timetable is presented in Appendix B. This pattern was disrupted only for special events such as field trips. Predictability in the normal day was considered essential, not only to give the children a sense of security but to help them develop some rudimentary notions about time.

During the first part of the program the children were indoors. They were on the playground for the last half to three-quarters of an hour of the school day. During the first half hour of the day, all of the children were engaged in free play. During the second half hour of the day some of the children were involved in individual or small-group teacher-guided sessions, while the others continued in free play. The small-group sessions lasted for about 15 minutes, and were usually conducted outside the main playroom in one of the school's small special project rooms. One of the small groups organized at this time prepared a snack which was offered at the beginning of the third half hour of the day. During snack time, the children joined one of the four teachers, each of whom was seated on the floor in a different part of the room. Four small informal snack groups were thus formed. One or two children in each group collected a tray of food, a pitcher of milk or juice, and cups, which had been put out on a low shelf. Snack time was used for relaxed conversation and discussion about what the children had been doing that day. As the children finished their snack they left the group and resumed the activity in which they had been formerly engaged.

At the end of the third half hour, teacher-guided large-group activities began. For these the children were divided into three groups of approximately nine children each, on the basis of their readiness for more advanced or less advanced activities and challenges. One group met first, in the smaller playroom, while the rest of the children remained in the large playroom and continued in free play. When this first group was finished, the children in it proceeded to the cloakroom and on out to the playground. Then the second group convened in the small playroom, and finally the third group was brought together in the main playroom. The duration of these group sessions was about 15 minutes for the older children and a bit less for the younger ones. After "group" the children proceeded to the playground. The order in which the three groups were organized was rotated so that all of the children had, over a block of time, equal opportunities for outdoor play.

Organization of the Staff

Zone placement of the teachers was applied throughout the whole program. The teachers were scheduled to be in specific places at specified times. This gave the children a maximum amount of independence. They found their own way through the school and from one activity to another, but if they needed help a teacher was always available. This was done not only to increase self-confidence and independence but to save the children time and to avoid frustration and confusion. LeLaurin and Risley (1972) found that when a teacher was responsible for a group of children whom she led from one activity to another, she not only wasted a good deal of their play time, but also interrupted their play, and the herding produced disruptive behavior.

Arrivals and changeovers from one part of the program to another, and into or out of group activities, were all carefully managed to avoid herding and crowding. At arrival time there was a relaxed teacher sitting in an armchair in the reception area waiting to welcome the children and their parents. A second teacher was in the cloakroom and a third, in the main playroom. Although the children often arrived in "bursts," the receiving teacher's responsibility was to see that the children proceeded into the cloakroom individually or two or three at a time. She did this by chatting with them and having them help find their names and record their attendance. This smoothed out the flow of children through the cloakroom and on into the playroom. The slow-paced arrival in the playroom gave the children an opportunity to decide what they wanted to do (make plans) and to settle down without conflict or distraction. This procedure, along with the design of the playroom described earlier, also helped to set the stage for the production of a relaxed atmosphere and concentrated task-oriented play.

There were four teacher timetables and the teachers operated within the framework of these timetables in rotation. Each teacher used one timetable for a full week and then changed over to a different one. This made it possible to provide every teacher with the same opportunities to work with the children in all phases of the program. Furthermore, the teachers knew in advance exactly what their responsibilities would be and could make plans accordingly. The schedules were planned so that the duties which required most preparation time were spread over the four timetables. The four teacher timetables are shown in Appendix C.

Teacher's Role and Teaching Styles

Apart from the children themselves, the teachers were considered to be the most important elements in the program. They were much more than designers and organizers of the environment. They were a highly significant part of that environment. Their approach to the children and the way they interacted with them were considered critical in attaining both the personal-social and cognitive goals.

It was not difficult to decide what kinds of teaching styles would help the children develop self-esteem, trust in teachers, self-control, perceptual and motor skills, peer social competence and even more effective cognitive and learning styles. Information of both a scientific and practical sort was plentiful to guide decisions in these areas. Much less was known, however, about the kinds of teaching strategies which would activate cognitive information processing of the kind that preoperational children are typically able to do. Thus, our greatest challenge was to discover such strategies and the search for them occupied our attention continuously. We were highly motivated to be successful in this search for the sake of the low-income children. We thought that if we could get them thinking more and more, that their cognitive structures would mature, their cognitive functioning would improve and their real intellectual potential might be actualized.

The following will provide information about the way the teachers worked with the children during free play, and a brief description of the procedures they used to attain each of the major objectives. However, the work that went into finding ways and means of working with the children to achieve certain of the cognitive goals (number, classification, spatial relations) was so extensive that it is dealt with separately in the three chapters that follow this one.

Free play. During free play the teachers tried not to be too conspicuous. They avoided haste and bustle. They located themselves where they had a full view of their area of responsibility and sat down as much as possible. When they moved through the room they did so at a leisurely pace and quietly. When they directed the children, they spoke to each one individually, made sure they had their attention, gave them time to comprehend what was said and did not "rush" them. They spoke quietly and did not raise their voices in an attempt to direct a group of children, or the whole class. In this way they avoided distracting children who were playing productively, avoided raising the noise level in the room and facilitated the maintenance of a tension-free atmosphere.

They were unobtrusive and tried not to interrupt the children's play unless it was absolutely necessary for safety reasons, or because the play was aimless and likely to be unproductive. In such cases information would be transmitted about the danger and the children helped to re-organize, and the aimless child would be helped to find an interesting activity. The teachers were *not,* however, passive. They were active observers and highly responsive. When asked a question or for help, they took advantage of these "teachable moments" to sharpen the children's wits. When asked a question, for example, they might raise a question, or several questions, to help the children find the needed answer themselves. Or, when asked for help with a puzzle, they would help the children think about ways to find the piece that would fit. The point here is that they ***did not show*** the children how to solve their problems and ***did not solve*** their problems for them. Rather, they tried to help them find ways to solve their own problems independently. Of course if it was a simple skill with which they needed help, such as using scissors, the teacher would show them what to do, but even in this type of situation the children were helped to understand how the scissors worked and why it needed to be held in a certain way.

The children were not required to "finish" things like puzzles. If they lost interest before they had completed a puzzle they were encouraged to put it away and try another day. The effort put forth was recognized and commended and the difficulties they had encountered were attributed to the task (i.e., "That is a *very* hard puzzle"). The real thrill and real growth in self-confidence comes when a task has been difficult and is finally mastered. If the teacher shows the child how to complete the puzzle she takes away the child's chance to have that thrill—someday. The teacher's job is to make sure the child does not attribute the failure to himself and to encourage the trying until there is success. Additional information about teaching styles in free play is provided in Appendix D.

Self-esteem. To help the children develop a sense of personal worth the teachers were careful to take a personal interest in each one of them and to treat each one with warmth, respect and consideration. When a child had something to say they took time to listen. They gave each child individual attention and took pains to commend effort and recognize accomplishment. They did not, however, attempt to play the role of "mother." They did not "cuddle" the children, although they held them when they were hurt or frightened. They responded warmly to affection and never rejected a child's advances, but they did not encourage dependency. They used no personal incentives or reinforcements. They did not ask the children to "do it for me," or say that they were "proud of them" or "ashamed of them." Rather they were non-judgmental in their role as teachers. They were helping the children learn many things; they knew mistakes were inevitable and were objective about them. Their aim was to help the children deal with failures and disappointments and turn them into learning experiences.

Trust in teachers. To instill trust the teachers were trustworthy. They were consistent in the requirements they made and were dependable. If the plan for the day was to be changed, the children were forewarned. If an exciting forthcoming event was announced, that event occurred. The teachers were as open and honest with the children as possible and did their best to convey the message that they were genuinely interested in their well being.

Self-control. The procedures used to manage the behavior of the children were aimed at helping them learn how to manage themselves. Therefore, an *instructional approach* was used to inform them about the limits and requirements. *Statements* were employed, never commands—except in rare emergencies. The teacher would say, for example, "the tricycles stay on the highway," "books are for reading," "we turn off the taps after we finish washing," "your coat goes in your cupboard." When the children were first learning the requirements, explanations were added. Later, simple reminders were usually enough, for example, "Did you forget to turn off the tap when you finished washing?" The statement is just as definite as the command, but it conveys information which is permanent and applicable whether or not a teacher is present. The command depends on the presence of a commander and the child who is always told what to do, or not to do, tends to remain dependent. Furthermore, the force implied by the command frequently produces resistance and defiance, which is avoided by the statement.

The teachers, as a group, determined the limits. Thus they were applied consistently and could not be viewed by a child as only a whim of a particular staff member. The basic limits of the school are described in Appendix A.

Achieving self-control is not, however, just a matter of knowing the rules of the game. It also involves making decisions about whether it is worthwhile to conform to these rules and this can be learned only through testing the limits and finding out. Therefore, the children were not coerced into conformity, but allowed to make choices and experience consequences. The consequences were, however, never punishments that would inflict stress or threaten self-esteem and they were always administered in an objective, non-judgmental way that would avoid resentment. They were logical consequences which could be understood by the children and they were aimed at teaching the reasons for the requirements. For example, if a child in the sandbox was throwing sand and, after instruction about how sand was used, did not stop, the child was told that being in the sandbox was conditional on not throwing sand. If the child again threw sand, he or she was removed from the box. Note that the child was first given positive instruction about how to behave, then informed about the consequences and then allowed to experience the consequences. The teacher did not scold or blame the child or stand the child in a corner, because this would have confused the real issue. The child was free to play anywhere else on the playground, except in the sandbox.

Thus, an attempt was made to provide the children with a completely predictable environment in which they had the opportunity to learn that they could control outcomes by thinking ahead. It also gave them a chance to discover that they could cope with consequences; that consequences were not necessarily a disaster, but provided useful information that could be used to obtain more desirable outcomes in the future. Competent adults take many calculated risks and are enabled to do so because they have faith in their ability to cope successfully with consequences (Blatz, 1966). Note that this was a cognitive approach to the management of behavior which encouraged the children to consider cause and effect relations, to make predictions and to test out those predictions. It also put the locus of control squarely in the child.

Social competence with peers. Since experience is probably the "best teacher" for learning how to get along with one's peers, the teachers interfered in the children's social play as little as possible and only when it became dangerous, destructive or so disruptive that it was interfering with what other children were doing. Then an explanation of the reason for the interference was given, and if appropriate, some social information about the feelings and rights of other people and the need to consider them was given. If the children were engaged in complex group play, such as dramatic play, the teacher would help them get back into the theme that was being enacted and redefine their roles. She would then leave them to resume their play. Note that attempts were made to help the children acquire social knowledge and also that the teachers did not just discipline the disruptive group, but tried to help them re-organize their play.

With new children who had had little or no experience with their peers, the teacher's job was to make sure that their first experiences of this kind in the preschool were not stressful. The organization of the environment, which minimized crowding, and the organization of the teachers, which eliminated herding, was especially important for these children. They were able to find some privacy and able to find interesting things to do by themselves, until they became used to the other children, became interested in their novel and unpredictable ways and then took some experimental steps to produce effects on them. The small group teacher-guided sessions were especially helpful in assisting children who were less confident with their peers to increase their confidence.

Perceptual and motor skills. The environment was rich in opportunities for discovery learning in the sensory and motor areas. Through arts and crafts and carpentry activities the children developed the desire to master many skills that required eye-hand coordination, and gained sensory experience with colors, shapes, textures and the like. On the playground they were challenged by the equipment to perform a wide range of strenuous athletic feats so that they would achieve large motor coordination. They learned about music through singing and dancing, first in group activities with a teacher, and later through their own explorations in the music room, or the "sound" center which was one of the novel centers introduced each year. Many shelf toys consisted of equipment which presented problems which could be solved only by making fine perceptual discriminations. The teacher's job was to involve the children in tasks of these kinds which were appropriate for their developmental levels.

Cognitive development. In any preschool program, but especially in a cognitively oriented one, the curriculum must be in the "minds" of the teachers (Weikart et al., 1971). The more fully they understand what they are trying to accomplish the more skillful they become at recognizing "teachable moments" and saying or doing appropriate things.

The goals in the problem-solving and cognitive styles areas were clarified in the minds of the teachers by having them participate in the development of a set of six rating scales. These scales measured a child's self-direction, mastery motivation, self-management/responsibility, curiosity/exploration, creativity and imagination. The scales were used in the assessment of the immediate impact of the program, so copies of them and a copy of the manual which clarifies exactly what behaviors were rated are appended to Chapter 8.

The goals in three major cognitive ability areas were "built into" the minds of the teachers by having them work together to develop what we have called Assessment and Curriculum Guides. The need for these guides was great. The individual differences in the cognitive abilities of the children in the preschool were wide and it was exceedingly difficult to know where to start with them. The problem of the "match" had to be solved. We focused on the processes which, according to Piaget, underlie the development of logical thought. These were the same processes which were the focus of Weikart's program. As noted earlier, they were number, classification and spatial relations.

Each of three teachers took responsibility for reading the scientific literature in one of these three areas to find out what was known about the abilities of pre-operational children and the order in which they developed. The amount of information available was incredibly small. However, we developed preliminary guides and then modified them on the basis of our own experience. They are described in the next three chapters. The teaching strategies employed in the cognitive areas are also described in these chapters and so will not be discussed in any detail here. The teachers worked with the children individually or in small groups. They also arranged the preschool environment so that the concepts acquired in the small groups could be transferred into free play activities, thus facilitating their assimilation. Efforts to stimulate thinking were also made when the children were in larger teacher-guided groups.

Perhaps the only comments that should be made here about teaching styles in the cognitive areas are general ones, the most important being that no direct instruction was employed. The stimulation sessions were discovery sessions. The teachers' goal was to produce wondering and inquiry and they did this, not so much by asking the *children* what, why and how questions, but by asking *themselves* such questions (e.g., "I wonder what will happen if . . .").

Finally, dramatic play was used extensively as a means of stimulating representational thinking. However the way this was done changed over time. Therefore, a description of this aspect of the program is included in Chapter 6.

Language

Some readers may wonder why language development was not specified as one of the program's primary objectives. There were many reasons for this, but the fact that it was not so specified should not be construed to mean that language development was ignored. Language was recognized as an important representational system as well as a means of communication, and much attention was paid to its growth. In addition, an attempt was made to instill in the children a desire to both read and write.

Language was not made a primary objective because, first, a Piagetian perspective on language development was adopted, which holds that language reflects cognitive development, but does not produce it. Second, the latest research findings on language development at the time suggested that concepts are grasped first and are then labelled; that children's first concepts (and first words) are of things they act upon and can change; that children discover meaning and then comprehend the words which express it (Macnamara, 1972; Nelson, 1974). This suggested that the focus of the program should be on conceptual development and that if the program was successful in promoting conceptual development it would also be successful in promoting language development. Third, exploratory work done in the second project year, which is described more fully in Chapter 6, satisfied us that if, for example, in small-group work the focus was on conceptual development, language development would also be facilitated. Fourth, language development was not made a primary objective lest this would lead to artificial bombardment of the children with language which was meaningless to them as well as distracting and unproductive.

The final reason for not focusing on language was that our own early research findings suggested that language, per se, was not the primary problem of the low-income children being served. The differences between them and the high-income children on the language tests were relatively modest as compared with the differences between them in other areas. However, about one third of the low-income children did present special language problems, and in such cases, extra-preschool professional help was obtained, for both diagnostic and treatment purposes. Their difficulties were primarily articulatory and in about half of the cases were associated with auditory and respiratory problems. Medical attention was obtained for those who needed it and then, if they were three-year-olds, no further treatments were immediately arranged. However, if they were still difficult to understand at the beginning of their second preschool year, extra-preschool professional help for them was obtained. Also, children enrolled as four-year olds who presented speech problems were immediately referred for diagnosis and treatment. The treatments were arranged through the University's Department of Communicative Disorders. Speech therapists were used, not only because of their special expertise, but because the preschool was interested in promoting fluency. The teachers provided language models, but did not correct the speech of the children, lest such intervention would inhibit their spontaneity of expression.

The children were helped to develop language by increasing their knowledge and by giving them meaningful and exciting experiences to talk about and ask about, and they were listened to when they had something to say. As the children acquired new ideas they were helped to acquire the language to express them. Illustrations of how this was done are provided in the three chapters that follow this one.

Thus an attempt was made to help the children develop a strong language competence base and this was regarded as the best way to facilitate the later acquisition of skills in reading and writing. Reading is an extension of receptive language, that is, the child acquires the ability to understand the spoken word (sound symbols) and later the written word (graphic symbols). Writing is an extension of productive language, that is, the child acquires the ability to produce words (sound symbols) and later to write them down (use graphic symbols).

An interest in reading was encouraged by helping the children discover the value of books as a source of enjoyment and as a source of information. The teachers read to them, the children enacted the stories and then they enjoyed the books on their own in the book-nook. Resource books were also used extensively in the science center. The children learned to recognize their names and sometimes to print them. Printed word labels were used extensively in the school (Stop and Go signs on the highway, appropriate labels in dramatic play centers and the like) and some children did learn to read in the program. Letters were also provided for use in free play—some were magnetic board letters and others, large wooden letters. A typewriter was also introduced for a period of time each year.

An interest in writing was encouraged by having the children dictate "thank you" letters to those who had provided opportunities for field trips and to others who were ill. A newsletter was also produced quarterly. The children thought up things to say in it, about school events, which the teachers wrote down. Some of the stories were illustrated by the children and they were "published" under their names. One of the children learned to print and was able to write his own story but he was an exception. A number of the children did, however, learn to print signs for use in projects which were of interest to them.

Approach to Parents

No formal parent education program was offered by the preschool, but an attempt was made to involve the parents in the program, to make them feel at home in the preschool and free to discuss their children with the teachers at any time.

Semi-formal evening meetings were held with the parents four times each academic year. The first of these was used to explain the objectives of the preschool and discuss the program. The rest were used to discuss topics of special interest to the parents, but each year one of these meetings focused on child management.

The parents were encouraged to observe from the observation rooms as often as possible, as a means of monitoring their child's progress. Special arrangements were made for small groups of parents to observe on specified days at the end of the fall term and again in the spring term. On such days, a teacher was made available to talk with each parent individually about the progress of his or her child.

Parents were invited to participate in field trips and most of them were quick to volunteer. They were also invited to participate in the program on other occasions if they had a special talent which could be used. A mother or father sometimes conducted a special project with some of the children (e.g., made bread) or took a group for dramatic play with, for example, puppets, or introduced a new instrument to the children at group time. There were also, of course, some parties and picnics in which the parents were involved.

The parents of the low-income children were helped, when necessary, to participate in all parent events by providing them with transportation. They were also encouraged, as were the parents of the high-income children, to discuss with the staff any worries they had about their children. Thus, all parents were treated alike, with respect and consideration, and given help with their children according to their individual needs. Any additional support that was required by the families of the children was provided by extra-preschool community resources.

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Appendix A

BASIC LIMITS AND REQUIREMENTS IN THE UNIVERSITY LABORATORY PRESCHOOL

1. *General*

The children must always be under the supervision of a teacher and remain in the preschool until picked up by their parents. All areas where a teacher is not present are out of bounds.

The children are encouraged to walk and not run inside the school. Both shouting and running are outdoor activities. Climbing is done outside or in the gym, and indoor furniture is not used for this purpose.

Equipment (e.g., toys, sand, water) is used for appropriate activities and is not thrown about.

Children are encouraged to be actively involved in some activity (this includes watching). If they are wandering aimlessly, the teacher intervenes, helps them to make plans and to get started in carrying them out.

After children have finished with equipment, they put it away unless another child is using it or would like to do so.

2. *Indoor Free Play*

(a) *Constructive and creative play areas:* These are "think" and "do" areas. Quiet talk and task-oriented behavior are encouraged.

(b) *Dramatic play areas:* The number of children in these areas at any one time is limited to the number of necklaces or hardhats left at the entrance to these centers by the staff.

Smocks are worn for painting, waterplay and other potentially messy activities.

3. *Snack*

The teacher who is responsible for snack informs the other teachers that snack is ready and sets out snack trays and juice. Teachers settle children in four small groups on the floor. One child from each group is asked to get the snack tray and the juice for his/her own group. The snack is shared among the children while conversation is encouraged by the teachers. When the children have finished snack, they discard their empty cups in the wastebasket and return to play.

4. *Cloakroom-Washroom Routines*

(a) *Arrival cloakroom routine:* Children take off their outer clothes and hang them up in their own lockers. Each is asked by the teacher whether he/she needs to have a try at the toilet (a few children are required to have a try at the toilet at entrance time). If not, then the child proceeds to the playroom. If yes, then the child flushes the toilet and washes his/her hands before going into the playroom.

(b) *Washroom routine:* Those children who come to use the washroom on their own and those sent by the staff are taught the following routine:

- use the toilet with the toilet seat appropriately raised or lowered
- flush the toilet after use
- wash hands
    - put in plug
    - fill sink with water
    - use soap, wash hands
    - pull plug
    - rinse hands in fresh water
    - dry hands with the paper towel
    - discard paper towel in wastebasket
- return to playroom

(c) *After circle changeover to outdoor free play:* The children enter the washroom, are asked if they would like a try at the toilet. If yes, they go through the routine described in (b) above.

If no, they proceed to put on their outdoor clothes.

When dressed appropriately (if it is cold, the teacher makes certain the children are zipped up, have hats and mittens, etc.), they proceed independently to the playground.

5. Playground: Danger Rules

(a) *Certain equipment is used in only specified areas:*

Tricycles - on bike track only (two-way traffic on cement and one-way traffic on the deck)

Wagons - on track, and in building area if carting building materials

Sand - in sand box

Water - in water tub, sand box or planters

Large blocks - in the large block area only

Small red cedar blocks - can be hauled anywhere except in the climbing-sliding area where they could be dangerous

(b) *Climbing apparatus:* Climbing *up* is done on the green carpeted ramp that has footholds, on the stairs or on the jungle gym (not on the slides).

Climbing *down* is done on the slides, the stairs or the jungle gym (not on the green carpeted ramp). There are two slides. On the one which comes right down to the deck, the children may slide down sitting, on their tummies, on their backs, etc. The other slide terminates about one foot above the deck. On this slide, the children must *sit* only, otherwise they may hurt themselves at the bottom. *No standing* is permitted on either slide.

(c) *Use of toys:* No toys of any kind except soft sponge balls are used near or on the climbing apparatus *except* in the winter when heavy snow makes it safe to use toboggans or sliding saucers.

All equipment (including sand, water, paint, etc.) is used for constructive or creative activities and not thrown or destroyed (e.g., tricycles charging or ramming into other tricycles, wagons, walls or equipment).

No tall structure or ladders and blocks which can be piled high are placed anywhere beside the fence (to prevent any child from attempting to climb over).

Note: See Guidelines for Student Teachers for additional information (Appendix D).

Appendix B

UNIVERSITY LABORATORY PRESCHOOL TIMETABLE

8:55 - 9:15 a.m. 12:55 - 1:15 p.m.	*Arrivals:* (in the reception area) One teacher receives, greets the children individually and records arrival (Attendance Sheet). The children then proceed independently into the cloakroom and the parent or driver departs.
8:55 - 9:20 a.m. 12:55 - 1:20 p.m.	*Cloakroom (and Toilet):* The children remove outer clothing and deposit same in their own cupboards. They are asked if they need a try at the toilet. If so, they use the toilet and then wash their hands before proceeding into the playroom. If not, they proceed immediately into the main playroom.
9:00 - 10:10 a.m. 1:00 - 2:10 p.m.	*Indoor Free Play:* (main playroom) The children select their own activities. The teacher may help them make plans or assist in certain ways, functioning as a "stimulator," a resource person and responsive agent.
9:25 - 10:00 a.m. 1:25 - 2:00 p.m	*Small-Group Teacher-Guided Activities:* (10- to 15-minute sessions which are run concurrently with indoor free play, usually outside main playroom) Children are invited to these group activities and participation is voluntary. Activities may be planned to meet individual development needs (e.g., language or cognitive stimulation), to teach new skills (e.g., carpentry), to enhance interest (e.g., in dramatics), or to prepare snack for the entire group.
9:55 - 10:05 a.m. 1:55 - 2:05 p.m.	*Toilet Routine:* Required for some children, suggested for all others. Children use the toilet and then wash and dry their hands.
10:05 - 10:15 a.m. 2:05 - 2:15 p.m.	*Snack Time:* The teacher who is responsible for snack informs the other teachers that snack is ready and sets out snack trays and juice. Teachers settle chil-

dren in three small groups on the floor. One child from each group is asked to get the snack tray and one the juice for his/her own group. The snack is shared among the children while conversation is encouraged by the teachers. When the children have finished snack, they discard their empty cups in the wastebasket and return to play.

10:15 - 10:40 a.m. 2:15 - 2:40 p.m.	*Large-Group Teacher-Guided Activities:* The year begins with two groups of about 14 children each. The two groups are convened at approximately the same time, one in the reception area and one in the playroom. The reception area group begins first and the main playroom group starts about 10 minutes later so that the first group is through and into the cloakroom before the second group moves in. Participation in these circles is voluntary. Activities include music, stories, dramatics, games, conversations (normally a variety of activities). Children who do not choose to participate are busily engaged in quiet activities in the playroom. Later in the year, the class is divided into three groups of about nine children each. One group convenes at 10:15 a.m. (or 2:15 p.m.) in the reception area. When the first group is finished, the children go to the cloakroom and then outside, and the next two groups convene. The group in the reception area starts first, followed shortly by the one in the playroom.
10:30 - 10:55 a.m. 2:30 - 2:55 p.m.	*Changeover Period:* (from indoors to outdoors) Children are dismissed from group activities a few at a time and go into the cloakroom to dress for outside. (Toilet Routine is included for specified children.)
10:45 - 11:30 a.m. 2:45 - 3:30 p.m.	*Outdoor Free Play:* (required for all children) The children select their own activities. Outdoor facilities are designed to stimulate, primarily, physical and social development.
11:20 - 11:30 a.m. 3:20 3:30 p.m.	*Dismissal Procedure:* Parents or drivers come through to the playground to collect their children.

Appendix C

UNIVERSITY LABORATORY PRESCHOOL TEACHER TIMETABLES

Teacher A—Timetable

8:55 a.m.
12:55 p.m.
Wait in the reception area for the children, and as they arrive, attempt to speak to each one (noting if they have coughs, sniffles, fever, etc.) and then check off their presence on the attendance sheets. If they do have a health problem, contact the parent about it (immediately if it seems serious or after school if not serious). Attempt to "dribble" the children into the cloakroom to allow teacher there enough time to get each child through the routine. Wait until all the children have come. If a child is away for three days and no phone call has been received, phone the parent to see what the problem is. Write parent's response on attendance sheet and inform other teachers. Putting away all the "donations" left in the reception area will also be your responsibility.

9:15 a.m. (approx.) Prepare for your special group or go into the playroom to work with the children. For the special group, you can select up to five children and take them into a separate part of the school or into a separate room for a particular activity you would like to do with these children. When finished, the children are sent back to the playroom, and another group can be taken or just resume work with children in the playroom. During the winter you will be responsible for opening, supervising and tidying the large block room in the reception area.

9:55 - 10:05 a.m.
1:55 - 2:05 p.m.
Check with Teacher C that you are ready to do washroom routine. Proceed to the washroom and "oversee" the activities using reminders where necessary. Keep track of any accidents on attendance sheets posted there. When washroom routine is finished, inform Teacher D so she may begin the snack routine.

10:05 a.m. (approx.) 2:05 p.m.	When informed that snack is ready, move to an open area in the playroom and quietly gather the children nearby into a snack group. Have one child bring the snack tray and one child bring the juice pitcher. In the winter you may be having snack in the block room area with the children who are playing there.
10:15 a.m. 2:15 p.m.	Tidy up. Ask the children (who are in the first circle) who have been playing in the housekeeping center, block area or other "messy" areas to begin to tidy up. As the time nears, these children should be finishing clean up and other children (who may still be playing with "quick clean up" things, puzzles, Plasticine, etc.) can be told it's time to tidy up and to join the circle taking place in the reception area.
10:15 - 10:30 a.m. 2:15 - 2:30 p.m.	Assume leadership of the senior circle and have activities aimed at providing fun for the children. Design a final activity in circle so that you can "dribble" the children into the washroom in about a two-minute time period. Go into the washroom and aid Teacher B (or D) until first children are ready to go outside. As soon as some are ready, open the door and go outside yourself. This routine will vary slightly when a three-circle program has been implemented.
11:20 - 11:30 a.m. 3:20 - 3:30 p.m.	At outdoor tidy up, ask those children with blocks to put them away. As the parents arrive, send the children with trikes to the garage.

Teacher B—Timetable

8:55 - 9:00 a.m. 12:55 - 1:00 p.m.	Make sure the playroom is set up and ready for the children.
9:00 a.m. 1:00 p.m.	Supervise the playroom as a whole until second teacher arrives in the playroom. Attempt to greet each child as he/she enters the playroom and to informally ask the child what he/she would like to play with that day. If some specific art project is planned, it may be started when Teacher D enters the playroom. You may concentrate your

	attention on the art area and work with the children in that area.
10:05 a.m. (approx.) 2:05 p.m.	When informed that snack is ready, move to an open area in the playroom and quietly gather the children nearby into a snack group. The teacher on snack will provide the snack and one child can be sent from the group to retrieve the juice while another gets the tray. The planned art activity can continue during this period if there are children still interested,but at 10:05/2:05 begin to end this planned activity, since circle will begin soon.
10:15 a.m. 2:15 p.m.	Tidy up. Ask those children (who are in the first circle) who have been playing in areas requiring extensive clean up to begin tidy up. Leave remaining children playing until just before 10:15/2:15 and then begin "dribbling" them to reception area for circle. When there are two circles, you will assist the senior or junior circle and then alternate to assist in the other circle in the afternoon. This routine will vary slightly when a three-circle program has been implemented.
10:30 - 10:45 a.m. 2:30 - 2:45 p.m.	When the circle is over, the children are "dribbled" (using a song or a game) to the washroom. You move to the washroom with the first children sent to the washroom. Ask them if they would like a try at the toilet, and if necessary, assist them in getting dressed. The circle person will assist you until the first children are ready to go outside. Then they will proceed outdoors. You will continue to help the children until they are all outside. Then you can return to the playroom if there are two teachers already outside. If there is only one outside, you go outdoors yourself until another teacher replaces you so you can return to clean up indoors.
10:45 - 11:30 a.m. 2:45 - 3:30 p.m.	Tidy up the playroom for the next program. This includes cleaning art area, fixing up puzzles, straightening blocks and other shelf toys, setting up housekeeping center and straightening chairs and tables.

Teacher C—Timetable

8:55 a.m. 12:55 p.m.	Receive first children in the washroom area. Ask the children to take off outer clothing—helping those in difficulty—and then initially ask all of them to have a try at the toilet. When most of the children have gone into the playroom, proceed there yourself and take over supervision of the room as a whole.
9:10 a.m. 1:10 p.m.	Supervise the playroom in entirety since only two teachers will be present and Teacher B will be involved in the art area. You may get involved with one or a group of children but keep your attention focused on the whole room as well.
9:55 a.m. 1:55 p.m.	After consulting with Teacher A, "dribble" small numbers of children into the washroom for toilet and washroom routine, then remain in the playroom to supervise the area.
10:05 a.m. 2:05 p.m.	When informed that snack is ready, move to an open area in the playroom and quietly gather the children nearby into a snack group. Once the snack has been put out, have one child retrieve the tray and another the juice pitcher.
10:15 a.m. 2:15 p.m.	Tidy up. When it is time for circle, help the children tidy up and then help "dribble" the children to circle.
10:15 - 10:30 a.m. 2:15 - 2:30 p.m	Assume the leadership of the junior circle and have activities aimed at providing fun for the children. Design a final activity in circle so that you can "dribble" the children into the washroom in about a two-minute time period. Go into the washroom and aid Teacher B (or D) until first children are ready to go outside. As soon as some are ready, open the door and go outside yourself.
10:30 - 11:20 a.m. 2:30 - 3:20 p.m.	Remain outside with the children, taking your break when the third teacher comes back outside. On your break begin and/or continue clean up in the playroom.
11:20 - 11:30 a.m. 2:20 - 2:30 p.m.	At outdoor tidy up, ask children with blocks to tidy up. As the parents arrive, send the children with trikes to the garage.

Teacher D—Timetable

8:55 - 9:15 a.m. 12:55 - 1:15 p.m.	Await the arrival of the children in the cloakroom-washroom area. Remain there assisting the children if necessary in the removal of their clothes until all the children have arrived.
9:15 - 9:55 a.m. 1:15 - 1:55 p.m.	You can then move into the playroom to work with one child or a group of children or you can begin a special group or a group for snack preparation. For the special group you can select up to five children and take them into a separate part of the school or into a separate room for an activity you would like to do with them. When you are finished, the children are brought back to the playroom and another group can be taken if time permits, or you can just begin work in the playroom.
9:55 a.m. 1:55 p.m.	Before snack, "dribble" small numbers of children into the washroom for toilet and washroom routine, then remain in the playroom working with individual or small groups of children.
10:05 a.m. (approx.) 2:05 p.m.	Inform the other teachers that snack is ready and set the trays and juice out on the cupboard near the pillar. When the block room is open, you may need to take a snack tray there prior to informing the other teachers that snack is ready. Join one of the groups for snack or settle with a group that has been formed by the children under the direction of the other teachers.
10:15 a.m. 2:15 p.m.	Ask those children (who are in the first circle) who are or who have been involved with doll center, block areas or other areas requiring extensive clean up to begin "tidy up time." As the time nears (10:15/2:15), tell the other seniors (or juniors) that it is tidy up time and to move to the reception area for circle.
10:15 - 10:30 a.m. 2:15 - 2:30 p.m.	If seniors have gone to reception area for circle, remain with Teacher C in playroom and continue to work with juniors. If juniors are going to reception area for circle, go with them and aid Teacher C with circle. After the circle, move to cloakroom and assist children

	in getting dressed and going outside. Join Teacher C outside as soon as all juniors are outside. That is, if juniors go to reception area first, follow timetable of Teacher B from 10:15/2:15.
10:30 - 10:45 a.m. 2:30 - 2:45 p.m.	Approximately ten minutes after senior circle has started, gather the children for circle with Teacher C. When circle is completed, move to cloakroom as Teacher C begins to "dribble" the children to you. Help them to dress if necessary and then move outside.
10:45 - 11:20 a.m. 2:45 - 3:20 p.m.	Stay outside until you take your break—when Teacher C returns.
11:20 - 11:30 a.m. 3:20 - 3:30 p.m.	Aid tidy up outside and the sending of the children to their parents who will be waiting under the canopy.

At least once a week either before school starts or when it is over, check the science area to make sure the activities have been changed or that new ones have been added.

Note: This timetable is written for a two-circle program. When a three-circle program is being utilized, the above positions remain basically the same with changes occurring for all teachers as circle begins. A three-circle system is initiated when it is deemed appropriate for the children to be in smaller groups and/or groups selected according to the ability levels of the children. The location and movement of the teachers for a three-circle system varies depending on which teacher is assigned to lead the extra circle.

Appendix D

UNIVERSITY LABORATORY PRESCHOOL GUIDELINES FOR STUDENT TEACHERS

1. ***General***

   Teachers are relaxed. They avoid haste and thus give the children time to think. They direct children individually and quietly to avoid distracting others. In this way, the teacher contributes to the serenity of the room and avoids exciting or overstimulating the group.

   Children are given as much independence as possible in choosing materials, solving problems and moving from play center to play center. For example, when directing children, verbal rather than physical direction is used as much as possible. Taking children by the hand as a form of direction is generally avoided. Teachers are stationed at various centers or locations, such as the cloakroom, and the children move through the school independently.

   Every adult-child interaction is a learning experience for both. The children are learning how adults in their environment respond to their statements, questions and strategies, and the teacher is learning how the children are reacting to the immediate situation.

2. ***Free Play*** (Indoors and Outdoors)

   During free play teachers are *unobtrusive,* taking care not to interrupt children who are concentrating on a task. If a teacher thinks he/she can enhance or prolong the children's interest in what they are doing or lead them to greater understanding, the teacher may make informational statements or offer suggestions related to the children's ongoing activity. (Suggestions not related to the ongoing activity tend to be disruptive.) If the children ignore or refuse a suggestion, the teacher does not insist.

   The teacher is active (not passive). She is interested in what the children are interested in and *supports* their efforts during free play by acting as a *resource* person (i.e., by giving out information and helping the children make and carry out their plans). The teacher is highly *responsive* and pays close attention when children have something to say. She/he uses every opportunity to reinforce the children's efforts to communicate, to expand the children's ideas or to encourage thinking (e.g., pondering some discrepancy, change or relationship). Sometimes the teacher may participate in the children's play if she/he thinks this may improve the quality of the play, or help maintain it after she/he has left. She/he may read to the children or work with them on puzzles, but care must be taken that this does not make the children dependent on the teacher.

When a dispute arises over who has done something "wrong" and the teacher does not know which child is responsible, she/he does not ask who did it (so that lying is not reinforced). Rather, she/he tries to encourage the children to resolve the problem and resume their play, or if this is unsuccessful, she/he redirects both children and does not place blame on either. The redirection may involve separation of the children. Whenever possible, social information is given to the children in such situations. That is, the reasons for behavior which is acceptable are stressed.

3. ***Supervision in the Playroom*** (Indoors)

One teacher is assigned the task of being general supervisor. This teacher must be aware of what is going on in every part of the room. While she/he may move around, she/he must always be in a location from which all areas can be seen. This teacher will often need to redirect children whose behavior is not purposeful, anticipate "flare-ups" in groups (e.g., from overcrowding in an area) and take steps to avoid them.

Teachers other than the general room supervisor settle down in an area (i.e., sit in or near some learning center, on a chair or, more often, on the floor) and are available as resource persons. When the teachers feel that they have nothing to contribute that might improve the quality of the play, they move quietly to another area. Teachers should avoid staying in any specific area for a very long time except under exceptional circumstances. The teacher assigned to the art center, however, remains in that center whenever there are children present. Teachers do not dash or wander about because this makes them conspicuous, tends to distract the children and induces following behavior.

The teacher in the *arts and crafts area* is responsible for keeping supplies on hand, providing materials for special creative projects and assisting the children in various ways. She/he helps them plan and execute special projects and learn motor skills such as cutting, stringing beads, etc. She/he also introduces them to new materials such as play dough, etc. She/he puts the name of the children on their products and sees that they are carefully stored.

When children are playing with *"structured" toys* (educational, self-pacing, self-correcting materials such as puzzles, form boards, peg boards, etc.), the teachers do not demonstrate the "proper" use of these materials. They do not complete a puzzle or form board for the children, nor do they use extraordinary means to induce the children to complete it. Teachers may offer information or suggestions which the children may use in finding a solution to the problem, but if the children have clearly lost interest they are encouraged to put the materials away. The teachers reassure the children if they seem discouraged and suggest that they try again another day.

The children are often invited to participate in *teacher-guided small-group activities* during the indoor free play period. Normally one to three children are included in these small groups. Their activities are usually carried out in a location outside the main playroom. The purpose of these small-group sessions varies.

Circles (larger groups) provide an opportunity for the children to learn about interacting in a larger group of peers. Although circles are often designed to provide other types of learning experiences for the children (e.g., discussing seasons, holidays, emotions, etc.), the main objective of these activities is to encourage the children to have fun and enjoy the social experience. Circle activities are teacher-directed and may include singing, stories, discussion, creative movement, instrumental music, etc. Sometimes special visitors are invited to participate in circles (e.g., doctor, dentist, musician, policeman, puppeteer, etc.). The teacher assisting in the circle also assumes an active role. She/he participates along with the children in the musical activities and unobtrusively redirects those children who are having difficulty attending to the circle activity. However, if a child decides to leave circle, he/she is not required to return if he/she does not wish to. Children are dismissed gradually, with children being sent to the cloakroom (or playroom) individually or in small groups of two or three.

4. *Cloakroom-Washroom*

In the cloakroom, the teacher tries to remain seated as much as possible, letting the children come to her/him if necessary for aid. This avoids confusion, helps the children develop independence and enables the teachers to look after one specific child and, at the same time, keep track of the progress and needs of the other children in the room.

The children are encouraged to dress and undress themselves. Help is given when needed but the task is always the children's. Help is offered in a form that will teach. The children's attention is kept on the task (e.g., the teacher asks questions about what comes next and just does enough to get them started, always letting the children see what they are doing so that they can learn to do the task themselves). Winter dressing (snowsuits, etc.) is a complex task and the children may need some help or they will lose interest and begin to "dawdle." Again the adult may "give the children a hand" and do quite a lot but she/he never takes over the task. The teacher helps the children, *never* the children help the teacher. It is the children's job.

The younger children are required to go to the toilet at certain times and they are taught a washroom routine. Care is taken not to interrupt their play and they are directed to the washroom at "changeover" times in the program (e.g., before snack). The child is told that "it is time to use the toilet." Older children who know the washroom routine and are responsible are not required to use the toilet, but are reminded at regular times to consider using it. They are asked "do you need to go to the toilet?"

A teacher supervises the washroom and teaches the washroom routine. She/he also keeps records of involuntary urinating or bowel movements.

5. *Changeovers*

When the children are sent from the reception area to the washroom, from the playroom to the washroom or from circle to the washroom, they go individually or in small groups (two or three children) rather than en masse. This procedure avoids crowding, confusion, excitement and frustration. Both teachers and children are relaxed, the children can think about what they are doing without distraction and the teachers can give them the help and guidance they need.

6. *Supervision Outdoors*

Teachers are responsible for supervising specified zones on the playground. They remain in these zones unless an emergency occurs (see the medical, accident and fire procedures in the teachers' office). When all of the children are on the playground there must be at least two teachers outside at ***all*** times. See Basic Limits sheet for danger rules.

7. *Suggestions for Students*[*]

If in doubt about how to handle a particular situation with a child when no teacher is nearby, handle it as best as you can but speak to a teacher about it later. If a teacher is nearby, try to ask her/him what ought to be done and then carry through the recommendations yourself. When one teacher is handling a situation you should never interfere even if you think she/he is completely wrong. Discussion of the situation can take place later with the teacher involved.

We probably haven't covered everything so when in doubt or if you have more questions, ASK.

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[*] When involved in the preschool program, students are expected to carry out the role of the teacher as outlined in the Guidelines.

8. ***Teacher Responsibilities*** (General)

The teacher should always be where he/she is supposed to be so that the children are always supervised and if she/he needs to leave for any reason, another teacher should be informed so he/she can accept responsibility.

A child should never be taken from under a teacher's supervision without informing her/him that you are taking the child and when the child is brought back the teacher should be informed.

All teachers help to put the school back in order after each session (sort the equipment in the toy boxes, see that supplies are in their proper place). The environment is thus "prepared" for the next session.

3

Helping the Preschool Child Develop Number Abilities[1]

During the preschool years, children become interested in numbers and their meaning. Hence, it is an excellent time for teachers to encourage the development of some simple number concepts and skills, if this is done in an informal and enjoyable way and no pressure to excel is applied.

Young children gain their first working knowledge of numbers through everyday experiences such as when they determine the required number of cookies for a group of children, choose which child will get his or her coat "first" and generally play games and sing songs involving numbers. In the preschool, "number" can be made a part of the children's regular daily activities, and as such, can become functionally meaningful. Numbers need not be "taught" to young children as a special tedious memory task. Instead, many enjoyable opportunities for children to "catch" the meaning of numbers can be provided.

Preschool children's understanding of number concepts seems to develop in a continuous and orderly fashion. They appear to progress through a series of levels of comprehension and performance. However, it is important to remember that within these levels there are wide individual differences in the order in which different kinds of abilities and concepts are acquired.

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[1] This chapter and its appendices were written in collaboration with Carol Wagg. Carol was a member of the teaching staff of the preschool from 1973 to 1980. She was the first assistant from 1973 to 1976 and then taught on a half-time basis after she began to undertake advanced studies in psychology. Her research for the Master's degree, which she obtained in 1977, investigated some variables which affect the ability of young children to perform number tasks. The research was conducted under the supervision of C. J. Brainerd.

To select appropriate number experiences for any given child (or group of children), the teacher must know that child's level of functioning in the number area. The teacher's initial task, therefore, is one of assessment.

The UWO Laboratory Preschool Number Abilities Assessment and Curriculum Guide (see manual in Appendix A) was developed in our preschool not only for assessment purposes but also as a curriculum guide. It was used not only to determine what abilities each individual child already had but to suggest abilities which that child was probably ready to acquire. The Guide was therefore used as a "tool" for "matching" the challenges offered the children to their developmental levels.

In this chapter we provide a general description of what is measured by the Guide and a brief discussion of the variables which influence a child's ability to perform a number task. We then describe the ways in which we attempted to promote the acquisition of number concepts and abilities in the child and include examples of the specially designed activities and games which we used for this purpose. We also suggest other resources for teachers.

Included in the appendices, in addition to the Manual for the UWO Preschool Number Abilities and Assessment Guide (Appendix A), is a Record of Performance Form for use in recording the developing abilities of an individual child (Appendix B) and a list of references to the research literature which we found helpful in developing the Guide (Appendix C).

THE GUIDE

The Guide describes abilities and concepts which are typically acquired at each of three levels: LEVEL 1 (typical of most three-year-olds), LEVEL 2 (typical of most four-year-olds) and ADVANCED LEVEL (typical of five- to seven-year-olds and, therefore, of some "advanced" preschoolers). It makes provision for assessment in four areas as follows:

1. Knowledge of the *ordinal properties* of numbers
2. Knowledge of the *cardinal properties* of numbers
3. Knowledge about *numerals*
4. Knowledge about *number transformations*

Each natural number (0, 1, 2, etc.) has two basic properties, ordinal and cardinal. The *ordinal* property of number refers to the "order" or position of an item in a series of items (e.g., "I took the *third* penny in the row; I read the *fourth* page in the book"). The *cardinal* property of number refers to quantity: "manyness," "numerosity" (e.g., "I have *three* pennies," "I read *four* pages"). Thus, in Area 1 (knowledge of the ordinal properties of number) the ability to count and to seriate are assessed. In Area 2 (knowledge of the cardinal properties of number) the ability to state the number of items in a set and the ability to understand the meaning of words and concepts such as more-less and same-different are assessed. In Area 3 (knowledge about numerals) the child's ability to orient, recognize, name, match and order numerals is assessed. In Area 4 (knowledge about number transformations) some aspects of the child's conservation ability and understanding of the effects on quantity of addition and subtraction are assessed.

Many variables influence the child's ability to perform a number task. These include (1) the number of items in a set, (2) the similarities and differences among the items employed, (3) the spatial arrangements of the items, (4) the level of representation required by the task, (5) the kind of language competencies demanded by the task and (6) the subjectivity-objectivity of the task.

Number of items. The number of items in the sets with which the young preschool child is first asked to deal should be small. They should contain only three objects. Also, number experiences offered young children in the preschool should begin with only the first three numbers (1 to 3). Once children thoroughly understand number principles as they apply to small sets, they usually transfer them readily to larger sets. In the Guide, therefore, the number of items in the sets to be used are specified for each task.

Similarity of items. The items in sets presented to very young children should be identical. A two-variable situation is too difficult for them, and distracts their attention from the task. In the Guide the degree of similarity among the items in sets is therefore specified. At LEVEL 1 all items are identical, but at LEVEL 2 they may be different.

Spatial arrangements. The spatial arrangements of the objects in a set (or sets) affect young children's ability to perform a variety of number tasks. It is easier to count objects when they are arranged in a row and are equidistant from each other than when they are spread out in an array. Therefore, the Guide specifies the way in which sets of objects should be presented (spatially) to the child.

Level of representation. The level of representation required by a task affects its difficulty. Younger children are able to solve problems when they are dealing with real concrete objects such as cookies, pennies, blocks, cars or dolls (object level) but are not able to do so when they are asked to deal with symbols of objects (e.g., pictures of cookies, pennies, etc., or dots on, for example, dominoes). Therefore, at LEVEL 1 the tasks are usually done with real objects. At LEVEL 2 they are done with symbols of objects.

Kind of language competency. The kind of language competency required in a task affects its difficulty. Helping children acquire number concepts and abilities involves helping them acquire a number vocabulary. Children come to understand words spoken by others (receptive language) before they can produce those words themselves (productive language). Thus children are able to point out, or show the teacher, which of the three bears is the "biggest" before they can say that "this bear is the biggest." The tasks at LEVEL 1 assess mainly receptive, not productive, language.

The subjectivity-objectivity of the task. Children seem to understand many concepts and have a vocabulary for expressing those concepts when the reference is to themselves and other people before they understand them or can talk about them in reference to objects. For example, they know and can say that they want to be "first" before they can look at a row of cars (e.g., a train) and find the one that is the "first" car.

In the Guide, within each level, an attempt has been made to order the tasks from least difficult to most difficult. However, there are wide individual differences in the ways in which children develop and their abilities across cognitive areas are frequently uneven. In developing the Guide, use was made of what scientific literature was available on the early development of abilities in this area. There was, however, little agreement among investigators about the order in which, or the age at which, certain kinds of number abilities were acquired. Also, some of the newer literature (Brainerd & Fraser, 1975) suggested that ordinal concepts were grasped earlier than cardinal concepts and that number programs for young children should begin with ordinal, rather than cardinal, tasks. Some theoretical hierarchies were, however, proposed and these were used to design a preliminary form of the Guide. This was then modified over time on the basis of our own experience with the children in our preschool. It is important for the user of this Guide to realize, however, that this is just a "guide," not a test. It is not based on carefully collected normative data. For those readers who would like to explore the literature which we found useful in the preliminary design of the Guide, a list of "References to the Research Literature" is contained in Appendix C.

In the Guide, "curriculum notes" are sometimes inserted. These are suggestions to teachers for instructional purposes. For example, "pointing" at each object when counting out a set is a strategy (perhaps a way of remembering what has been counted) which helps children perform many number tasks more efficiently. One curriculum note in the Guide draws the teacher's attention to this and suggests that she should, in her teaching role, encourage children to develop this strategy.

ACTIVITIES FOR PROMOTING NUMBER CONCEPT ACQUISITION

In our preschool, opportunities for the children to increase their understanding of number were provided in three parts of the program: (1) *during free play*, (2) *during group activities* and (3) *in teacher-guided very small groups (two to four children)* or individual sessions. A more detailed description of the procedures used in each of these parts of the program is provided below.

In January, the curriculum focus in the small groups was on number. At this time the use of number songs and games was increased in the circles, and new number centers and number materials were introduced into the playrooms. The new opportunities in the play areas were created to encourage the transfer of any new ideas acquired about number during the teacher-guided sessions into the children's free play, so that it would be better assimilated.

Free Play: Centers and Equipment

Permanent fixtures. Certain permanent fixtures in the playroom were used to stimulate an interest in number, for example, a real, large clock which was located at "child-height" in a place where it could be incorporated by the children into their play, as well as used to time special events or activities. Our clock was located in the area in which dramatic play centers were developed. When a medical center, hairdressing salon or similar center was there, the children often referred to the clock when making or keeping appointments. The clock could be seen from most locations in the playroom and so could be referred to frequently by both the children and teachers to time, for example, the baking of food that the children had made for snack, or to calculate how long a child had stayed in a given place or how many minutes before an event would occur.

Calendars were used, too. They were large and interesting and could be manipulated by the children. For example, the October calendar was in the form of a tree with 31 fall leaves numbered 1 to 31. More advanced preschoolers could choose from a set of leaves the one that matched the date of the day on the calendar and glue it on the calendar in the appropriate place.

Dramatic play centers. In our restaurant, shoe store, grocery store or ice cream parlor, articles for sale were priced and a cash register and play money or chips were used. In the medical center a height and weight chart was included. In the housekeeping center, seriation was encouraged (e.g., three pots varying only in size were hung in order of size on a special pegboard and there were three dolls varying in size, each with its own set of clothes). Centers were set up to suggest the enactment of stories such as "The Three Billy Goats Gruff" and "The Three Bears," which involved the children in seriating (the littlest goat, the middle-sized goat and the big goat) and in matching seriations (the big bowl for the big, big bear and the little bowl for the little bear).

Science center. Measuring instruments such as rulers, thermometers, weigh scales, etc. were introduced in the science center. The weigh scale was used with unit blocks (e.g., two 1-unit blocks = one 2-unit block).

Felt board activity center. This center was equipped with boxes which contained materials such as the following: three felt pictures of yellow flowers and a card imprinted with a large yellow 3; four felt red apples and a card imprinted with a large red 4; three to five felt dogs, doghouses and bones, each set of objects varying in size (the teacher would involve children in the game of giving each dog a doghouse and a bone big enough for him and in figuring out if there were enough houses and bones for each dog; she sometimes pretended to bury some bones and let the children decide how many they would have to dig up so that each dog would have a bone); three to five felt apple trees with the numerals 1 to 5 on their trunks, plus approximately 20 felt apples (the teacher would involve the children in figuring out how many apples the numeral said belonged to each tree, and in selecting that number from the pile of apples to attach to the tree).

Number center. An area was screened off and equipped with, for example, a magnetic board and a box of numerals and letters which the children could manipulate (separate numerals from letters, orient, order, etc.) or a box of three-dimensional wooden numerals and letters and a board on which they could be sorted. A typewriter or a real cash register was often included in this center. When the number center was large enough, other materials described below as shelf toys were included.

Shelf toys. We found stacking toys or any materials which encouraged the ordering of objects by size, shape, etc., were appropriate for younger preschoolers. For older preschoolers, dominoes were suitable, as well as number puzzles in which the pieces which go together must be found by matching numerals or dot-sets imprinted on the pieces.

Suitable materials were also "homemade": tin cans with a set of dots (1-5) on each and a bundle of popsicle sticks (the child selects and places in each can the appropriate number of sticks as indicated by the number of dots); clothes hangers with a card attached which is imprinted with a numeral (1-5), and a supply of clothes pins (the child places the appropriate number of clothes pins on each hanger).

Snakes and Ladders and similar games which involve rolling dice and counting off squares were also provided for older preschoolers.

Craft activities (creative center). Cutout paper numerals were provided in the creative center. The children used them in a variety of ways, for example, pasted them on paper, tried to copy them, pasted alongside them an appropriate number of objects, ordered them or just talked about them and their names (i.e., just became more familiar with their shapes).

Group Activities (the Traditional Circle)

Songs. Many songs which are favorites of preschool children and familiar to most preschool teachers involve number, and these were used to help children learn about numbers. Examples of such songs are:

"This Old Man"
"The Little Chickadees"
"The Chinaman Ship" (in "Sally Go Round the Sun")
"The Ants Go Marching" (in "Sally Go Round the Sun")
"Five Little Speckled Frogs"
"Down at the Corner" (*Panabaker's Song Book*)

Some of these songs (e.g., "Down at the Corner") were adapted to suit a variety of themes (valentines at the shop; leaves under the oak tree; gifts under the Christmas tree).

Fingerplays. Many fingerplays which involve number were used in the preschool. The examples of these which follow include rote counting, associating number to objects, counting backwards and ordering (first, second, third . . .):

1. "One, two, buckle my shoe
Three, four, shut the door, etc."

2. "Here is the beehive and here are the bees
Hidden away where nobody sees
Soon they'll come flying out of their hives
One, two, three, four, five."

3. "I have ten little fingers
And ten little toes
Two little ears
And one little nose

"I can wiggle my fingers
I can wiggle my toes
I cannot wiggle my ears
But I can wiggle my nose."

The children were encouraged to count all the things they had, such as legs, arms, buttons, ribbons, etc.

4. "Four little daisies smile at me
I pick one and then there are three
Three little daisies, petals wet with dew
I pick one and then there are two
Two little daisies dancing in the sun
I pick one and then there is one
One little daisy feeling very gay
I pick this one and have a summer bouquet."

5. "The first little caterpillar crawled into a bower
The second little caterpillar wiggled up a flower
The third little caterpillar climbed a cabbage head
The fourth little caterpillar found a melon bed
The fifth little caterpillar sailed a garden pool
The sixth little caterpillar was carried off to school
The seventh little caterpillar met a hungry wren
The eighth little caterpillar was frightened by a hen
The ninth little caterpillar fell into the sea
The tenth little caterpillar scaled an apple tree
and hung there patiently, until, by and by, the tenth little caterpillar became a butterfly."

Stories. We used stories, of which there are many, that involve counting and sequencing. Some have been mentioned earlier, such as "The Three Bears, " "The Three Little Pigs," "The Three Billy Goats Gruff." These are the type that can be enacted (dramatized) by the children. Other useful stories are ones like "Caps for Sale" in which the child picks out the red caps *first*, the yellow ones *second*, etc.

Games. We used a variety of games or game-like activities which are suitable for use with groups of 10-12 children. One of these is described later as a special small-group activity (see Special Small-Group Game #7). It utilizes a cuckoo clock to interest the children in using numerals and naming them to tell "time." Other examples are as follows:

> *Count the Number of People in the Circle.* Ask the children, "Who is missing? How many people are missing? If they were here how many people would there be in the circle?"
>
> *Dice Game.* Give each child a number. Throw the dice. The child who has the same number as the dice may have a turn to skip or dance. Many games can be invented which involve dice. Dots or numerals may be used.
>
> *Jump to the Number.* Scatter large number cards about the floor. The child jumps to the number cards in the correct sequence or to the number called out by the teacher.

Jumble Up. Five or six children wear large number cards. While the music plays, the children get mixed up. When the music stops they arrange themselves back into the correct order. The other children who are watching may check the sequence and assist the children.

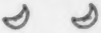
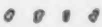
Simon Says. This familiar game may easily be adapted to involve number. "Simon says clap two times. Simon says jump three times." Simple repetition of claps involves counting something unseen and is often challenging. For example, one child claps out a certain beat or rhythm and the other children attempt to imitate it.

The Mailman. Boxes are used to represent houses and are numbered one to six. Children are given letters similarly numbered and deliver them to the correct house by matching the numeral. Number games such as this may be created to follow any theme.

Discussions. Everyday items which have to do with number were brought into the circle and discussed. Examples are: telephone, cash register, money, thermometer, stamps, license plates, clock, weigh scales, calendar, ruler, book page numbers. Matters of great interest to the children personally, which have to do with number, were also discussed. Examples are their age, their height, their address, their telephone number. Interest in some of the above can be developed during field trips or other special activities.

Individual or Small-Group Teacher-Guided Activities

Snack preparation. Cooking or the preparation of food for snack was used to provide opportunities for the children to develop an understanding of how numbers are used and about quantity and ordering. Following recipes requires a discussion of number in measurement (1 cup, 2 teaspoons, etc.). Recipes can be represented as shown below (for a fruit salad), so that "how many" of each ingredient is illustrated pictorially, along with a numeral which represents the quantity. The following recipe is for each child's serving (i.e., 1 piece of orange, 2 slices of peach, 3 slices of banana, 4 raisins).

1		(orange)
2		(peaches)
3		(bananas)
4		(raisins)

Preparing to serve the snack also involves making sure there are a sufficient number of servings for everyone (enough cookies) and utensils for everyone (cups, spoons, etc.). Therefore, counting was brought into the activity in this way.

Special activities. These are activities and games which were "specially" designed by the teachers in our preschool for two purposes: (1) to give the teacher an opportunity to assess the ability of a child to perform the tasks which are described in the Assessment and Curriculum Guide and (2) to stimulate the child cognitively and to provide an opportunity for the child to increase his or her understanding of some concept. A series of examples of these activities follows. For each, the cognitive area and the level to be assessed are indicated and then the specific purposes of the activity, the materials to be used and the procedures to be followed are described.

Special Small-Group Game #1

AREA Number: Ordinal Properties (a) counting, (b) seriation

LEVEL 1

Purpose:

to assess and encourage abilities with numbers 1-3:

(a) count row of three identical objects

(b) seriate three objects which vary only in size, from smallest to largest

(c) understand words (receptive language): smallest, biggest, middle-sized, bigger, smaller

(d) match two 3-object sets seriated by size

Materials:

1. a flannelboard
2. flannelboard stick-ons as follows:
   (a) set of three identical clowns of different sizes
   (b) set of three identical balls of different sizes
   (c) set of three identical trucks of different sizes

Note: The size differences between the clowns, balls and trucks should be large and obvious.

Procedure:

The teacher shows the clowns to the children and starts a discussion about them. The children are encouraged to talk about the similarities and differences they notice in the clowns. Then the teacher says, "Let's put the *smallest* clown on the felt board." "Sally, would you like to find the smallest clown and put it on the board?" When the smallest clown is on the board, the teacher says, "Let's put the *next biggest* clown on the board" and invites Sally or another child in the group to put the next biggest on the board and so on until all the clowns are arranged in a row from smallest to bigger to biggest. The teacher then encourages more discussion, suggesting that perhaps the clowns are lined up for a parade.

She then says, "I will now take the clowns down and it will be your turn to line them all up again for the parade from the smallest to the biggest."

When the children finish putting the clowns on the board, the teacher produces the set of balls and these are discussed. She then says, "Each clown needs a ball. The smallest one gets the smallest ball" (placing the smallest ball on the board). "Now, which one will we give to this clown (pointing to the biggest clown) and which one will we give to this clown (pointing to the middle-sized one)?"

The balls can then be taken off the board so that the children can put them back on and the whole process can be repeated with the set of trucks.

During the discussion, the teacher can ask the child, "Can we find the middle-sized clown, etc." "Is there a clown bigger than this one?" "Is there a truck smaller than this one?"

Special Small-Group Game #2

AREA Number: Numerals

LEVEL 1

Purpose:

to assess and encourage counting, pattern recognition of small sets, associating numerals with object sets and following directions in step by step ordering.

Materials:

1. recipe cards (one for each child) showing:
    (a) the quantity of each ingredient pictorially
    (b) the numeral which represents the quantity
    (c) the name of the ingredient as illustrated below:

1		pineapple
2		marshmallows
3		apples

2. dishes of:
    (a) pineapple pieces
    (b) miniature marshmallows
    (c) slices of apple
3. a box of toothpicks

Procedure:

The children have been invited to help make "snack." The recipe cards are prepared in advance and placed face down on the table.

Each child takes a card and "reads" what to put on the toothpick. The teacher helps each child to follow the directions, one step at a time, if necessary. If the child does not recognize the numeral, the teacher encourages the child to count the pictures.

Special Small-Group Game #3

AREA Number: (a) cardinal properties (b) numerals

LEVEL 1 (small sets) or LEVEL 2 (larger sets and cardinality rule)

Purpose:

to assess and encourage the ability to understand *more*, which of two sets has *more* items (i.e., 2 is more than 1; 3 is more than 2) and "the *same* number as"; and to recognize numerals, learn their names and discover the cardinality rule.

Materials:

1. a pack of nine cards, each with a numeral (1 to 9) on one side and pictures of cats (one to nine cats) on the other side. The numeral on each card indicates the number of cats on that card (i.e., four cats and the numeral 4).
2. duplicates of the first three cards in the set (i.e., the ones with one, two and three cats)

Procedure:

This game is played with only one or two children and it has a series of parts.

PART I: (LEVEL 1)

The teacher says, "This is a card game and I am going to give you each a card." She gives each of two children a card (with the cats facing up), making sure the cards differ widely in numerosity (e.g., a one-cat card vs. a five-cat card), and asks, "Who has the card with *more* cats?" When the children have answered they put their cards back in the pack and the teacher gives each child another card (two cats vs. eight cats) and asks, "Who has *more* cats now?" This procedure can be repeated several times to emphasize the use of the word *more*. When the ability of the child has been assessed, the teacher can encourage counting of the cats to determine who has *more*.

Finally the children can be dealt the one-cat and two-cat cards (and the two- and three-cat cards), which differ less in numerosity but involve only numbers 1 to 3, and asked, "Who has more?" and "How do we know he or she has more?"

PART II: (LEVEL 2)

The materials used are the first three cards in the nine-card set (one- to three-cat cards) and their duplicates.

The teacher places one set of three cards (cat-side up) on the floor (or table) and then gives one of the duplicate cards (cat-side up) to one child and asks, "Which card on the table has *the same number* of cats as this one?" She then gives a different card to another child and repeats her question.

PART III:

(LEVEL 1 if only numerals 1-4 are used)
(LEVEL 2 if numerals 5-9 are used)

If the children have not noticed the numerals on the backs of the cards, the teacher draws their attention to them, and explains that the numerals tell how many cats are on the card. She says, for example, "This is the number 1 so there is only one cat on this card." She then picks up another card, shows the child the numeral and asks, "How many cats must be on the other side of this card?" The teacher encourages counting if the child does not recognize the numeral, helping him or her discover that the last number in the count is the numeral on the card and tells how many cats there are.

If the child is still interested, all of the cards can be placed on the floor with the numerals facing up and the teacher and child (or children) can take turns asking, "Please find me the card that has *four* cats," etc.

Special Small-Group Game #4[1]

AREA Number: Both Numerals and Cardinal Properties (cardinality rule)

LEVEL 2

Purpose:

to assess and encourage the ability to

(a) recognize numerals 1-5

(b) understand the number of items each numeral represents

(c) understand that the last number named in counting a set represents the total number of items counted (cardinality rule)

(d) match sets of items to the appropriate numeral

Materials:

1. five doghouses with a numeral 1-5 on the top of each house
2. five dogs with 1, 2, 3, 4 or 5 spots on their backs

Procedure:

The teacher explains the problem to the child. "It is time for the dogs to go home, but the dogs are lost and do not know which doghouse is their own. The dogs need your help. Could you help the dogs find their own homes?"

The child may solve the problem which is to match the numbers on the doghouses with the number of spots on each dog. If he or she does not, the teacher points to the houses and says, "I wonder what all these numbers on the houses are; they are all different" and then draws the child's attention to the dogs and asks, "Do all the dogs look the same? This dog has only one spot. I wonder which house a dog with one spot would live in?"

If the child solves the problem, the teacher encourages him or her to explore how he or she did it. "Why does this dog belong in this house? How did you know to put him there?"

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[1] Adapted from the *Cars and Garages Game.* In Barata-Lorton, M. *Work jobs,* Don Mills, Canada: Addison-Wesley Co., 1972, p. 162.

Special Small-Group Game #5[1]

AREA Number: Both Ordinal (counting) and Cardinal Properties

LEVEL 2

Purpose:

to assess and encourage the ability to

(a) count out a sub-set (of sticks) from a larger set

(b) count out the number of sticks that are (1) equivalent in numerosity to a set of dots, or (2) indicated by a numeral (one-to-one correspondence)

(c) understand the words "more" and "most"

Materials:

1. five cans, each with a set of dots painted (or glued) on the front varying in numerosity from 1 to 5 *OR* five cans, each with a numeral from 1 to 5 on the front
2. a box of popsicle sticks (at least 15)

Procedure:

The teacher shows the children (or child) the sticks and the cans (they need not be arranged in any particular order) and tells them that she has a problem. She explains that the sticks belong in the cans and that she would like the child to help her sort the sticks and put the right number of sticks into each can. She explains that the dots on the front of each can tell how many sticks belong in it: "Here is a can—see the dots? How many sticks belong in this can? How many should we put in?"

After the response (correct or incorrect) the teacher encourages the child to tell how he or she knew how many sticks to put in the can. Counting can be encouraged and if the child made a mistake he may correct it spontaneously (recognize or remember the cardinality rule).

After the sticks are in the cans the teacher might ask the child (or discuss), "Which can has the *most* sticks?" and pointing to a can ask, "Is there a can with more sticks than this one?"

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[1] Adapted from the *Sticks and Cans Game.* In Barata-Lorton, M. *Work jobs,* Don Mills, Canada: Addison-Wesley Co., 1972, p. 150.

Special Small-Group Game #6

AREA Number: Cardinal Properties

LEVEL 2

Purpose:

to assess and encourage the ability to

(a) understand *more* with respect to quantity
(b) understand that color and/or size of the items in a set does not affect the numerosity of the set
(c) understand that the biggest pile does not always contain the most items

Materials:

1. a pile of small chips, identical in size, but varying in color (some blue, some red)
2. a pile of larger chips, identical in size, but varying in color (some blue, some red)
3. a table on which the teacher has marked out, with tape, a square, located in front of where each child will sit. The squares must be identical in size.

Procedure:

This game is played with two children. The children sit across from each other at the table. The teacher sits on the third side of the table between the children.

The teacher picks up some chips and hides them under the table and says, "Abra-cadabra, ziqa-ma-zoo, some chips for ____ (Jill) and some chips for you" and places some chips in each child's square. She then says, "Who has more? Does Jill have more or does Bill have more?"

The teacher presents chip-sets to compare (a set placed in each child's square) as follows:

1. chips of identical size and color to each child
    (a) six vs. two (large difference in numerosity)
    (b) four vs. five (small difference in numerosity)
    (c) four vs. four (no difference or the "same")
2. chips of identical size, but which vary in color, to each child, numerosity as above (i.e., six vs. two, four vs. five, four vs. four)
3. chips which vary in both size and color to each child, numerosity as above (i.e., six vs. two, four vs. five, four vs. four). At this phase of the game encourage the children to note not only (a) who has *more* but (b) who has *more* of the "big" or the "little" chips and who has *more* of the "red" or the "blue" or the "big blue" chips (helping the children to become aware of sub-sets within a set)

Finally the teacher may place a tower of three *big* chips next to a tower of five *little* chips (the latter tower should be much smaller than the former) and then ask, "Which tower looks 'bigger'?" "Which tower has more chips?" "Does the biggest-looking tower have the most chips?"

Special Small-Group Game #7

AREA Number: Cardinal Properties and Numerals

LEVEL 2 and more advanced children

Purpose:

to assess and encourage the ability to

(a) recognize numerals and name them (1-9)

(b) understand that each numeral indicates numerosity (e.g., the numeral 3 stands for three "things")

(c) produce the number of sounds indicated by each numeral (a more difficult task than counting out objects because the child may understand the meaning of the number, but be carried away by making the sounds and "forget" when to stop)

Materials:

a cuckoo clock—preferably homemade out of cardboard with an easy-to-move hour hand on its face and *no* minute hand. It may also have a little house above the face of the clock which has a little door out of which a cuckoo can pop (the cuckoo does not, however, cuckoo)

Procedure:

The teacher shows the children how the clock works (i.e., that when the hand points to *3* it is three o'clock and the cuckoo jumps out to sing cuckoo three times). She then says, "I have a song about a cuckoo clock. Would you like to learn it? This is how it goes." The teacher soon has the children singing:

"Cuckoo, cuckoo
Goes the little cuckoo clock
Now the time is *three* o'clock
Cuckoo, cuckoo, cuckoo."

When the last line is sung the teacher pushes the bird through the little door in the clock three times, in time to the singing of "cuckoo, cuckoo, cuckoo."

Now the game begins. The teacher changes the hand of the clock to a new number (e.g., 4). The child decides what time it is and is given a turn at making the cuckoo pop out the door and at doing the "cuckooing." The song may be sung again for each "new" time, and each child in the group has a turn at being the cuckoo bird.

Note: This game creates a great deal of interest, but the children find producing the proper number of cuckoos quite challenging. It is more appropriate for older preschoolers who have a fair understanding of numerals and can count than for younger preschoolers. Children who are unable to count objects successfully are not ready for this game.

Special Small-Group Game #8

AREA Number: Ordinal Properties (seriation) and Numerals

LEVEL 2

Purpose:

to assess and encourage the ability to

(a) seriate represented (pictorially) objects from smallest to largest
(b) match two seriations of represented objects
(c) associate numerals with a seriation (by size) of represented objects

Materials:

1. a set of five cardboard, cutout baseball bats, which vary by *length* (5, 6, 7, 8 and 9 cms respectively)
2. a set of five cardboard, cutout baseballs which vary in size (½, 1, 1½, 2, 2½ cm in diameter respectively)
3. five cards, each imprinted with a different numeral: 1, 2, 3, 4 or 5
4. a table with a long piece of masking tape stretched across it, parallel to edge of the table (the child does the seriation along this strip)

Procedure:

The teacher shows the child the bats and explains, "All the bats are different sizes, but you have to look very carefully to see which is the biggest one and which is the smallest one." The child may have to be shown how to place the bats next to each other on the line (or on top of each other) in order to determine which is bigger.

The teacher encourages the child to order the bats along the line from smallest to biggest. She says, "First, let's find the smallest bat" (then the "next biggest" and so on).

Once the bats are seriated in a line, the teacher shows the child the balls. She points out (as with the bats) that the balls are all different sizes, but one must look very carefully to determine which is bigger. She then explains that "Each bat needs a ball." "The smallest bat gets the smallest ball and the biggest bat gets the biggest ball." "Now, let's find the smallest ball" (then the "next biggest" and so on).

After the bats and balls have been matched, the teacher shows the children the number cards (spread out face up on a table in an array) and says, "Here are some numbers." "I wonder what these numbers are." (discussion) "Where is number 1?" "Let's put number 1 with the first bat." (If the child does not understand, the teacher points to the first bat at the left of the series—i.e., the smallest bat). When the child has placed the numeral 1, the teacher says, "Now I wonder which number goes with the next (or 'second') bat?" and so on until the seriated bats and balls are numbered 1 to 5.

The teacher may then ask, "How many bats are there?" (i.e., explore for knowledge of the cardinality rule).

Note: This is a game that should be attempted with only LEVEL 2 children who have shown themselves to be able to seriate a set of three pictures and recognize numerals 1 to 5.

Resources for Teachers

Projects

Barata-Lorton, M. *Work jobs.* Don Mills, Canada: Addison-Wesley Co., 1972.
Barata-Lorton, M. *Work jobs for parents.* Don Mills, Canada: Addison-Wesley Co., 1975.

Songs

Fowke, E. *Sally go round the sun.* Toronto: McMillan & Stewart, 1969.
Panabaker, L. *Lucille Panabaker's second song book.* Toronto: Peter Martin Associates Ltd., 1975.

Stories and Books for Children

Berenstain, S. & Berenstain, J. *Bears on wheels.* New York: Random House, 1969.
Freudberg, J. & Hefter, R. *Some, more, most.* One Strawberry Inc., 1976.
Hoban, T. *Count and see.* New York: McMillan, 1972.
Oxenbury, H. *Number of things.* London: Heinemann, 1967.
Wildsmith, B. *Brian Wildsmith 1, 2, 3.* Oxford, England: Oxford University Press, 1965.

The Three Bears

The Three Billy Goats Gruff

The Three Little Pigs

Appendix A

MANUAL FOR THE UWO LABORATORY PRESCHOOL NUMBER ABILITIES ASSESSMENT AND CURRICULUM GUIDE

General Instructions

In assessing the children's abilities, or in encouraging number concept acquisition, the approach of the teacher should be *informal.* Although each item in the Guide has been referred to as a "task," the teacher should avoid creating a "task-like" situation. The children should be assessed, or helped to learn, while engaged in game-like, curiosity-inducing activities in which they are clearly interested, and which they are clearly enjoying. Some abilities may be assessed during free play, but others will require observations made in small groups (two or three children) or in sessions with only one child.

The emphasis of the teacher should never be on "right" or "wrong" answers, but on creating a situation in which the child experiences the fun of trying something new, and the joy of working with the teacher at "figuring things out." Children should never be pressured into performing the tasks and their responses should never be criticized. Also, some children appear to be threatened by direct questions. They are unable to respond when asked, for example, "How many pennies are here?" With such children direct questions should be avoided. The teacher can put the onus to respond on herself by saying, "*I* wonder how many pennies we have here."

I. ***Ordinal Properties*** (Knowledge of number with respect to the ordering or positioning of objects in a series)

A. *Counting.* Counting is considered an ordinal task because each item must be considered only once and in a particular order.

LEVEL 1

1. Child recites numbers up to 3. Children are often able to recite a number sequence long before they understand the meaning of counting.
2. Child counts a small set of three *identical* objects arranged in a row (i.e., in a straight line with the objects equidistant).
3. Child counts a small set of three *different* objects arranged in a row.

Curriculum Note: Pointing at each object as it is counted helps children remember which objects have been counted. It also helps them understand the one-to-one correspondence between item and number. This is a strategy which can be encouraged during number stimulation activities.

LEVEL 2

1. Child counts a row of ten *identical* objects.
2. Child counts a row of ten *different* objects.
3. Child counts a series of three drum beats (or chimes). This is a more difficult task than counting objects because pointing is not possible, the sounds are less concrete than objects which are seen and there is no opportunity to "start over."
4. Child understands the cardinality rule (a row of five identical objects). The cardinality rule referred to here is that the last number named in the count represents the total number of items in the row. After the child has counted the row of objects, the teacher asks, "How many do you have?" (If the child does not understand the cardinality rule he may re-count the items, or give an incorrect number.)

Curriculum Note: When helping the child acquire an understanding of the cardinality rule, the teacher should start with sets of two or three objects (e.g., balls). She might say, "Let's count the balls to see how many there are" and point and count aloud with the child, announcing at the end, "There are three balls, aren't there?"

5. Child counts out sub-sets of five from a larger set of three *identical* items (e.g., five chips from a full box of chips). This is a more difficult task than counting a row of chips. To do it successfully requires an understanding of the cardinality rule (see number 4 above) and the ability to remember when to stop. Often children become so involved with the counting task that they forget to stop at the designated number.
6. Child counts out sub-sets of five from a larger set of items which *differ* (e.g., five blocks from a box of multishaped, multicolored blocks, or five toys from a box of miniature toys of varied types).

Curriculum Note: When helping the children acquire the ability to count out sub-sets, the teacher should start with sub-sets of two or three.

B. *Seriation*

LEVEL 1

1. Child orders a set of three objects, identical except for size (length or height), from smallest to biggest (e.g., three identical red ladders which vary only in length: 7, 10, 13 cm respectively). Note that the larger the differences in the size

of the objects, the easier the task becomes for the child.

2. Child understands the meaning of the following words in a three-item seriation of objects identical except for size (e.g., three clowns, three balls, three dolls): smallest, next-biggest, biggest, middle-sized, smaller, bigger. The teacher begins by asking the child to find the "smallest," then the "next biggest," etc. For most children it is easier to order the items from smaller to bigger and to look for the "next biggest" (rather than the "next smallest").

LEVEL 2

1. Child orders a set of five objects, identical except for size, from smallest to biggest.
2. Child matches two four-item size seriations. The teacher asks the child to order a set of identical objects which vary only in size (e.g., four paper clowns) from smallest to biggest. She then presents a second set of identical items (e.g., four paper cutout balls) which also vary only in size and asks the child to give each clown his special ball. "Let's give one ball to each clown. Here is the biggest clown; let's find the ball that belongs to him."
3. Child understands and can use the words "first," "last," "middle" and "next" when they are used in reference to self and other children (receptive and productive language) (e.g., "I am the *last* to go outside"; "Janie is sitting *next* to me."). Children usually understand these words when they refer to themselves or others before they understand them when they refer to objects.
4. Child understands the words (receptive language) "first," "last," "middle," "next," when they are used in reference to objects. In a row of three blocks, the child can find the middle one. In a row of five blocks, which differ in color, the child can find the one "next" to the blue one.

ADVANCED LEVEL

1. Child understands and can use the words "second," "third" and "fourth" when they are used in reference to self and other children. For example, I was the "third" chickadee; Janie will be the "fourth."
2. Child understands the words (receptive language) "second," "third," "fourth" when they are used in reference to objects. In a row of five blocks, can point out the second, third and fourth.
3. Child understands and can use the words "before" and "after" in relation to a series of events (e.g., "Your socks go on *before* your shoes." "We go outside *after* we put on our coats.").

II. ***Cardinal Properties*** (Knowledge of quantity, how much and how many)

LEVEL 1

1. Child recognizes "one-ness" and "two-ness" without counting (pattern recognition). When presented with a two-item set of identical objects and asked how many, the child reports "two."
2. Child understands "more" without counting:
   (a) recognizes "2" is *more* than "1."
   (b) recognizes that a set has "more" if the difference between it and the comparison set is large (e.g., five pennies vs. two pennies).
3. Child understands "the same" without counting. Recognizes as "the same" *two* sets of three real, identical objects which are spaced in exactly the same way. (∴ ∴) (two cards each having three real pennies on them). The pennies are placed on the cards to control the boundaries for each set.
4. Child understands "not the same" when presented with two identical-object sets which vary in number (a card with two real pennies and a card with three real pennies).

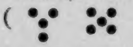
LEVEL 2

1. Child recognizes "three-ness" and "four-ness" without having to count (pattern recognition). When presented with a three- or four-item set of identical objects, arranged in a familiar pattern, (∴) (• • • •), the child reports the number of items in the set without counting.
2. Child understands "same number" and "different number" (three sets of *identical* objects). When presented with *three sets* of identical objects which differ in quantity, but are spatially arranged in the same way, and the sets contain no more than three or four items (e.g., all pennies) (••) (••) (∷), the child can select (a) the two that have the "same" number of items (b) the one that has a "different" number of items.
3. Child understands "same number" and "different number" (three sets of *differing* objects). As in number 2 above except that the objects in the sets differ from one another (i.e., are not identical—four marbles, three pennies, four crayons).
4. Child understands "more," "most" and "not as many." When presented with two sets of six and seven *identical* objects (two plates of six and seven cookies, or six and seven pennies) can determine, by counting, which plate of cookies has "more" and which has "not as many." Note that when comparing two sets of objects the task becomes more difficult as (a) the number of items increases and (b) the number difference between the two

sets decreases (i.e., comparing 2 vs. 1 [small numbers] is easier than 6 vs. 7 [large numbers]). Also comparing 2 vs. 6 (large number difference of 4) is easier than comparing 6 vs. 7 (small number difference of 1). The larger the number difference is between the two sets being compared, the more likely the child is to determine, readily, which set has "more" ***without*** counting.

5. Child understands that large numbers (i.e., 5 to 10) refer to "more" things than small numbers (i.e., 1 to 4). For example, the teacher asks, "If you wanted lots and lots of cookies would you ask for ten cookies or two cookies?"

ADVANCED LEVEL

1. Child understands the meaning of "more," "most," "least," "less" and "fewer." (Note that "less" is more difficult to understand than "not as many" which is a LEVEL 2 ability.)
   (a) *When items differ*
   When presented with two sets of six or less ***differing items*** (e.g., five vs. six) the child can determine which set has "more," the "least," "less" and "fewer" by counting (e.g., a plate containing one crayon, one eraser, one spoon, one fork, compared with a plate containing one marble, one pin, one cup, one barrette, one ring).
   (b) ***When size of items in smaller set is bigger***
   When presented with two sets of six or less items, and the items in the set with the fewer are bigger than the items in the set with the greater number (e.g., five "little" mice compared with four "big" elephants), the child can still identify the set which has "more," the "least," "less," "fewer."
   (c) ***When spatial arrangements of items in sets vary***
   When presented with two sets of six or less items (identical or differing) and the set with the fewer items is arranged spatially so that it covers a larger area (and looks bigger) than the set with more items (which is arranged so that it looks smaller) the child can still identify the set which has "more," "the least," "less," "fewer."
   ()

III. Numerals (Number symbols)

LEVEL 1

Curriculum Note: When first introducing young children to numerals it is helpful to use three-dimensional wooden or plastic numerals (or homemade cardboard ones) which the child can "feel" and manipulate. All of the tasks described below for LEVEL 1 are done with printed numerals, but with the youngest children three-dimensional numerals could be employed.

1. Child can orient and match numerals. The child is presented with two identical sets of four index cards with numbers printed on them, 1-4:
    (a) Can orient the numerals (i.e., place them so they are oriented correctly, not upside down, etc.).
    (b) Can match the numerals (i.e., put each pair of numerals which are "alike" or "just the same" together).

    (Note that the ability to do these two tasks usually precedes the ability to recognize numerals by their names.)
2. Child can pick out numerals by their names (receptive language). Child is presented with a set of four index cards with the numerals 1 to 4 printed on them. The cards are arranged in a random display. The child responds correctly to the question "Can you show me 2, 3, etc.?"

    (Note that selecting the numeral named is easier than naming the numeral. It requires recognition but not recall of the name, and receptive but not productive language.)
3. Child can name numerals. Child is presented with a set of four index cards imprinted with the numerals 1 to 4, arranged in an array. The child can respond correctly to the question "What number is this?" for each of the four numerals.

    (Note that for this task the child must recognize the number, recall its name and produce the name.)

LEVEL 2

1. Child can do all LEVEL 1 tasks with the numerals 5 to 9 (i.e., orient and match two sets of 1-9, select named numerals from a set of 1-9, name each numeral in a set of 1-9).
2. Child can order numerals from 1 to 9. The child is presented with a set of nine index cards, imprinted with the numerals 1 to 9, in an array. The teacher says, "Here is number 1" (and places it on the floor or table). "Now what number comes next?" If the child places 2 next to 1 the teacher then says, "And what number comes next to 2?" and continues to encourage the child until all the cards are ordered.
3. Child can separate numerals from letters. The child is presented with a box containing a three-dimensional magnetic board (or wooden or cardboard cutout), numerals (five or six) and letters (five or six). If this is done with magnetic numerals the teacher says, "The numbers and letters are all mixed up in this box. Let's find all the numbers and put them on the magnetic board."
4. Child can associate numerals (1-5) with a row of five objects which are seriated by size (i.e., can use numerals in an ordinal

task). The child is presented with a set of five identical objects which vary *only* in size, which the child can arrange in a series by size (see Ordinal Properties: Seriation, LEVEL 2). The child is invited to seriate the objects and, when this is done, is presented with a set of index cards imprinted with the numerals 1 to 5 which are arranged in an array. The teacher then says, "Which number shall we give to the smallest ball?"—"to the next biggest ball?"—etc.

5. Child can associate numerals (1-5) to pictorial sets (represented objects) (i.e., can use numerals in a cardinal task) in the following situations:
    (a) When the items in the sets are identical (i.e., all pennies, all red circles, etc.). The child is presented with (a) a set of five index cards on which sets of objects are represented pictorially, which vary in numerosity from one to five; and (b) an array of plastic (or wooden or cardboard numerals). The cards and numerals are presented in two arrays, side by side. The teacher picks up one card and says, "How many pennies are there in this picture?" or "What number belongs to this picture?" The child responds by placing the correct numeral on each of the pictures.
    (b) When the items in the sets differ (e.g., mixed sets of pennies, dolls, cars, blocks, etc.). The materials and procedure are the same as in (a) above except the five cards display sets in which the represented objects in the sets are not identical.

    (Note that the tasks in number 5 are the most difficult at LEVEL 2 because pictured objects instead of real objects are used. The pictorial material requires representational abilities greater than those required when real objects are used.)

ADVANCED LEVEL

1. Child can associate numerals to a seriated set of nine items. This is the same as the LEVEL 2 (number 4) task using up to nine items (i.e., six through nine as well as one through five).
2. Child can associate numerals 6-9 to *pictured* sets. This is the same as the LEVEL 2 (number 5) task with up to nine items (i.e., six through nine as well as one through five).
    (a) With identical items in the sets (e.g., the numeral 6 goes with the picture of six balls).
    (b) With items which differ within sets (e.g., the numeral 6 goes with the picture of the set containing one ball, one girl, one bat, one marble, one crayon, one ring).

3. Child can associate printed numerals (1-4) with the words "first," "second," "third," "fourth":
   (a) In a group situation the child can respond correctly to the question, "Karen is the *first* person in our parade, so what number will we give her?"
   (b) For a seriated set of identical objects (lined up in a row) the child can respond correctly to the question, "This is the *third* clown in the row, so what number should we give him?"

IV. Number Transformations

LEVEL 1

Children ordinarily do not acquire an understanding of number transformation at this level.

LEVEL 2

1. Child understands that adding to a set produces "more." The sets used should contain no more than five items and all items should be real, identical objects (e.g., five pennies). The teacher needs a total of eight pennies. She places three in front of the child and three in front of herself and says, "I have three pennies and you have three pennies. If I give you another two pennies who will have *more*?" The teacher shows the child the other two pennies, which she holds in her hand, but does not give them to the child.
2. Child understands that subtracting from a set produces a "smaller number" or "not as many." The sets should contain no more than five items and all items should be real, identical objects. The teacher gives the child three pennies and takes three pennies for herself and says, "I have three pennies and you have three pennies" and drops one and says, "Oh! Oh! I lost one—now who has the smallest number of pennies, you or I? Who has 'not as many' pennies?"

Curriculum Note: Games for stimulating the acquisition of an understanding of addition and subtraction may utilize more interesting materials (e.g., four dolls in a bed). One doll could be made to fall out of bed and the child could be asked, "Now how many dolls are in the bed? Are there 'as many' as before or 'not as many'?"

3. Child understands that a change in the size of the items in a set does not affect the number in the set. Teacher asks, "If I plant three tree seeds, how many baby trees should grow? If I wait a long time, how many big trees will I get?"

4. Child understands that a change in the spatial arrangements of the items in a set does not affect the number in the set:
   (a) With respect to themselves and other children. The teacher has four children stand in a row and asks them, "How many children are in this row?" She then asks them to dance until she calls out "freeze." They are now spread out about the room and she asks again, "How many children are there here now?" She then asks the children to form a "cluster" (i.e., to sit as close to each other as they can). Again she asks, "How many children are there here now?"
   (b) With respect to objects. The child is presented with five pennies, arranged in a row, and asked, "How many pennies do we have?" The pennies are then arranged in a square and the child is asked, "How many pennies do we have now?" The pennies are then presented in a cluster and the child is asked, "How many pennies do we have now?"

Appendix B

THE UWO LABORATORY PRESCHOOL NUMBER ABILITIES ASSESSMENT AND CURRICULUM GUIDE RECORD OF PERFORMANCE FORM

Marking Code Child's Name: ____________________

✓ Child understands (performs correctly)
X Child does *not* understand
? Teacher is not sure of degree of understanding
Comments on reverse side

YEAR					
DATE					
GAME (number)					
TEACHER					
I. Ordinal Properties (position in a series) A. *Counting* LEVEL 1 1. recites numbers 1 to 3					
2. counts a row of 3 identical objects					
3. counts a row of 3 different objects					
LEVEL 2 1. counts a row of 10 identical objects					
2. counts a row of 10 different objects					
3. counts 3 drum beats or chimes					
4. understands cardinality rule applied to a row of 5 identical objects					
5. counts out sub-sets of 5 from larger set of identical objects					
6. counts out sub-sets of 5 from larger set of differing objects					

B. *Seriation* LEVEL 1 1. orders set of 3 objects by size (e.g., 3 ladders, smallest to biggest)						
2. understands words and phrases used by the teacher in the above 3-item seriation (receptive language)	- smallest					
	- next biggest					
	- biggest					
	- middle-sized					
	- smaller					
	- bigger					
LEVEL 2 1. orders set of 5 objects by size (e.g., 5 ladders, smallest to biggest)						
2. matches by size two 4-item seriations						
3. understands and uses words in reference to self and other children (both receptive and productive language)	- first					
	- last					
	- middle					
	- next					
4. understands words in reference to objects arranged in a row (receptive language)	- first					
	- last					
	- middle					
	- next					
ADVANCED LEVEL 1. understands and uses words in reference to self and others (receptive and productive language)	- second					
	- third					
	- fourth					
2. understands words in reference to a row of 5 objects (receptive language)	- second					
	- third					
	- fourth					
3. understands and uses words in relation to a series of actions or events (receptive and productive language)	- before					
	- after					

II. Cardinal Properties (quantity: how much, how many?) LEVEL 1 1. pattern recognition of 2-item sets (recognizes 2 objects as "2" without counting)						
2. understands "more": (a) 2 is "more" than 1; (b) 5 pennies is "more" than 2 pennies						
3. understands the "same" when presented with two identical 3-item sets of identical objects						
4. understands "not the same" when presented with a 2-item and a 3-item set of identical objects						
LEVEL 2 1. pattern recognition of 3- and 4-item sets (recognizes number of objects without counting)						
2. understands (3- and 4-"identical-item" sets)	- the same					
	- different					
3. understands (3- and 4- "differing-item" sets)	- the same					
	- different					
4. understands (5- and 6- "identical-item" sets)	- more					
	- most					
	- not as many					
5. understands large numbers (5-10) refer to *"more"* than small numbers (1-4)						
ADVANCED LEVEL 1. (a) understands (2 sets of *differing* items 5 vs. 6)	- more					
	- most					
	- least					
	- less					
	- fewer					
(b) understands (2 sets of 5 and 6 items with "bigger" items in the 5-item set)	- more					
	- least					
	- less					
	- fewer					

(c) understands (2 sets of 5 and 6 items with space occupied greater for the 5-item set)	- more					
	- least					
	- less					
	- fewer					
III. Numerals (number symbols) LEVEL 1 1. printed numerals 1 to 4 (a) orients numerals 1 to 4						
(b) matches 2 sets of 4 numerals, each 1 to 4						
2. picks out printed numerals by *name:* 1 to 4 from a set of 4 (imprinted cards 1 to 4)						
3. *names* printed numerals (productive language) 1-4						
LEVEL 2 1. printed numerals 5 to 9 (a) orients numerals 5-9						
(b) matches 2 sets of 5 numerals, each 5-9						
(c) picks out printed numerals by *name:* 5 to 9 from a set of 5 (imprinted cards 5 to 9)						
(d) *names* printed numerals (productive language) 5-9						
2. orders printed numerals from 1 to 9						
3. separates numerals from letters (5 numerals, 5 letters)						
4. associates numerals 1 to 5 with a row of 5 objects seriated by size						
5. associates numerals 1 to 5 to "pictured" sets of 1 to 5 items (a) when items in all sets are identical (b) when items in sets differ						
ADVANCED LEVEL 1. associates numerals 1 to 9 with a row of 9 objects seriated by size						
2. associates numerals 1 to 9 with "pictured" sets of 1 to 9 items (a) when items in all sets are identical (b) when items in sets differ						

3. (a) associates numerals 1-4 to the words in a group social situation	- first					
	- second					
	- third					
	- fourth					
(b) associates numerals 1-4 to the words in a row of objects	- first					
	- second					
	- third					
	- fourth					
IV. Number Transformation (No LEVEL 1) LEVEL 2 1. understands adding produces "more" (3 pennies + 2 pennies)						
2. understands subtracting produces "a smaller number" or "not as many" (3 pennies - 1 penny)						
3. understands a change in size of items in a set does not affect its numerosity (3-item sets)						
4. understands a change in the spatial arrangement of items in a set does not affect its numerosity (a) 4-child set						
(b) 4-penny set						

Appendix C

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4

Helping the Preschool Child Develop Classification Abilities[1]

Very early in life children begin to organize their knowledge of the world by sorting people, objects and events into categories on the basis of some characteristic which they share in common. Thus, on seeing a very large dog a child may announce "horsey," which suggests that for this child all "big" animals are horses. Piaget has said that three-year-olds are at a pre-classification stage; yet, by this age, it is clear that they are capable of categorizing things which are highly meaningful to them. For example, they know their own sex and can sort out their peers by sex (i.e., classify them as boys or girls). They may not understand or be able to describe how they do this, but the processes required to accomplish it appear to be operating.

Most three-year-olds are, however, only beginning to develop the ability to classify the less personal and more objective aspects of their world. They are likely to display the ability to "put together" pairs of objects which are commonly associated in their experience and are functionally related, such as a toothbrush and toothpaste, or a pencil and paper. They may also be able to sort out from an array of objects all of the furniture (all of the food, all of the animals). These "conventional" categories are employed so frequently in the environments of young children that they quickly become meaningful to them. In this type of classification all of the objects are usually perceptually different (none look alike in any way), but they all have a similar functional meaning. Three-year-olds may not, however, be able to classify objects on the basis of their physical features (e.g., shape, size) or to understand the words "same" and "different" when they are applied to relatively meaningless objects such as blocks.

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[1] This chapter and its appendices were written in close collaboration with Karen Whistlecraft who was a member of the teaching staff of the preschool from the beginning of the second year of the project until its termination. She was trained at the University of Guelph and has a BASc degree in child study.

Four-year-olds, who are typically at a more advanced stage than three-year-olds, are usually able to understand the meaning of "same" and "different" and to categorize objects such as blocks, by color or shape. They are, however, likely to be erratic in their sorting behavior, to forget or "change their minds" about the sorting principle they are using (e.g., they may start to sort by color and then change to shape) or they may simply lose interest in the task and begin to use the blocks for other purposes (e.g., build a tower or make a bridge). However, classificatory abilities of importance are clearly developing in three- to five-year-olds, suggesting that "classification" is an appropriate curriculum area for the preschool.

Before teachers can start to work with a child in a way which will facilitate the acquisition of new classification abilities, they must first determine what the child already understands and can do, and what abilities he or she is probably ready to acquire (i.e., teachers must solve the problem of the "match"). The UWO Laboratory Preschool Classification Abilities Assessment and Curriculum Guide (see Appendix A) was designed for this purpose.

In this chapter we provide a general description of what is measured in the Guide and a brief discussion of some of the variables which affect a child's ability to perform a classification task. We then describe the ways in which we attempted to promote and support the development of classification abilities in the children and include examples of specially designed activities and games which were developed for this purpose. We also suggest other resources for teachers.

Included in the appendix, in addition to the Manual for the UWO Laboratory Preschool Classification Abilities Assessment and Curriculum Guide (Appendix A) is a form for recording the developing abilities of an individual child (Appendix B) and a list of references to the research literature which we found useful in developing the Guide (Appendix C).

THE GUIDE

The Guide describes concepts and abilities which are typically acquired at three levels: LEVEL 1 (typical of most three-year-olds), LEVEL 2 (typical of most four-year-olds) and ADVANCED LEVEL (typical of five- to seven-year-olds and therefore of a few advanced preschoolers). Within each level the tasks used to assess the children's ablities are ordered, to the extent possible, from the easiest to the hardest. There are, however, wide individual differences in the ways in which children develop and their cognitive abilities are often uneven. In developing the Guide use was made of what scientific literature was available on the development of classification abilities in preschool children, but there was no general agreement among investigators on the order in which various types of abilities were acquired. The preliminary version of the Guide was based on suggestions from research findings, but the final version, presented here, is a revision of the preliminary one, based on our own experience with the children in our preschool. It should be emphasized, therefore, that this instrument is *not a test.* The level at which each task is placed was not determined by gathering extensive normative data. The Guide is just a guide and should be used only as a guide.

There are many variables which affect a child's ability to perform a classification task. These include (1) the type of materials used, (2) the kind of response that is required from the child and (3) the way the materials are presented to the child.

Materials. The *representational abilities* demanded by the task affect its difficulty. It is easier for children to deal with *concrete* three-dimensional objects than with *representations* of objects (e.g., pictures). At LEVEL 1 the children are expected to sort only concrete objects, but at LEVEL 2 they are expected to be able to sort representations of objects.

Children's *knowledge* about and *experience with* the objects that they are asked to classify affect their performance. For example, children are able to categorize familiar and meaningful objects such as foods, furniture and clothes before they are able to sort out less familiar objects such as "tools" (saw, screwdriver, hammer, etc.). The former may be grouped by common association, but the latter requires inference and a greater degree of conceptual understanding. Also, children are able to categorize familiar and meaningful objects before they are able to classify objects on the basis of their physical properties such as color, shape or size.

The *number* of ways in which the objects, or pictures of objects, to be compared *vary* also affects the difficulty of the task. At LEVEL 1 the child is expected to be able to sort objects which vary on only one dimension (e.g., color) but at LEVEL 2 to sort sets which vary on two dimensions (e.g., to sort by color when the objects vary by both shape and color).

In pictured sets of objects which are to be sorted into same-different categories, the *type* of differences (as well as the number of differences) in the pictures influences the difficulty of a task. Preschool children can deal with certain kinds of transformations such as part-whole (part missing vs. object intact) and line-to-curve (see materials for task 3 at LEVEL 2 in the Guide), but have difficulty with rotations (right side up vs. right side down), reversals (facing right vs. facing left) and changes in perspective (appearance from side vs. appearance from front).

The *grossness* of the differences among the objects, or pictures of objects, to be sorted also affects the difficulty of the task. For example, sorting by size is easier when the difference between the size of the objects in each set is greater.

The response required of the child (receptive or productive language ability). Children understand words and can follow instructions before they can recall and produce appropriate words. At LEVEL 1 only receptive language ability is expected. The child picks out or points out the objects that are the "same" or "different" and puts all the ones that "are the same" together. Reporting *verbally* that two objects are the same is not expected until LEVEL 2. At the ADVANCED LEVEL the child may be able to define the common property of a class, list the members of the class, exclude objects from the class and recognize and state that an object has simultaneous membership in two classes.

Presentation of materials. The way in which the teacher presents a "game" which involves classification and the amount of information she gives the child can influence the difficulty of a task.

In the Guide, therefore, the tasks used to assess the children's abilities are described in terms of the materials used, the response required of the child and the procedure to be followed by the teacher.

ACTIVITIES FOR PROMOTING THE DEVELOPMENT OF CLASSIFICATION ABILITIES

In our preschool, opportunities to discover the principles involved in classification were provided in three parts of the program: free play, group activities (traditional "circle") and small-group (two or three children) or individual teacher-guided sessions.

In mid-February the focus in the small-group sessions shifted from "number" to classification. In the "circles," especially the senior ones (four-year-olds), more classification games were played, and in the playroom new equipment which would stimulate sorting and grouping was introduced. Examples of the types of equipment and activities used in each of these situations follow.

Free Play: The Play Areas

The playroom was organized so that it would provide the children with many classification experiences as part of their everyday activities. Most of the space was divided into "centers," which would provide "object lessons" in classification on a regular basis. All of the materials in most centers would "go together" in some way (i.e., could be used together in a functionally meaningful way). The children soon learned where everything "belonged" (e.g., the dishes in the housekeeping center, the books in the book-nook, the tools in the woodworking area, the paper, crayons, paint, scissors, etc. in the arts and crafts center) and gradually began to understand why. Their understanding was facilitated by their experiences, but also by the informal guidance of the teachers.

Permanent dramatic play centers. Two centers, a housekeeping and a block center, were provided on a permanent basis. Within each of these centers equipment was included and arranged in ways which would encourage sorting behavior. In the housekeeping center the "clothes" went in the "clothes cupboard," the "dishes" in the "dish cupboard," the "cutlery" in the "cutlery drawer" and, in the latter, a cutlery tray suggested sorting into subclasses of spoons, forks and knives. In the block center, designs of the blocks were painted on the shelf liners, showing where each shaped (and sized) block should go. Tidying up then became an exercise in sorting by shape and size which the children thoroughly enjoyed, and they discovered the differentiating features of objects independently. As the children became more aware of how the blocks differed, they began to use this information in developing their block constructions. They would "size-up" a problem, decide what was needed to complete a construction (e.g., a larger triangle) and then purposefully select the required block. If the blocks varied in color, this increased the difficulty of sorting by shape and size, but it was a suitable challenge for older preschoolers.

Special dramatic play centers. Throughout the year, special centers, not offered on a permanent basis, were designed to provide classification as well as other kinds of valuable experiences. In the grocery store the "stock" was sorted and "shelved." The shelves were labelled (words *and* pictures) showing where the cans of fruit, soup, vegetables and juices were to go. The children were, of course, involved in the setting up and organizing of the store as well as in running it (i.e., playing store). Play money was used and this also was sorted into paper money (bills) and "coins."

In the medical center there were the *instruments* a doctor uses. In the hairdressing center there were the things we use to take care of our hair. In the post office there were letters and parcels to sort. In the restaurant there was kitchen equipment and dining room equipment to organize. All were sorted and organized for meaningful purposes.

In the dramatic play centers which generated fantasy-based themes (e.g., enacting stories), sorting and categorizing also occurred. In the "Three Little Pigs," children were selected to be the "pigs." In "The Three Billy Goats Gruff," children were chosen to be the "goats," etc.

Other special centers. Centers which generated private, parallel or just associative, rather than group, play were set up and equipped to encourage sorting and classifying behavior. These often induced, as well, a good deal of imaginative play. There was *a doll house center* equipped with a house in which all the floors and rooms were visible and accessible to the child. The equipment included appropriate-sized furniture, so that each room could be furnished (kitchen, bathroom, bedroom, living room) appropriately. Appropriate-sized mother, father and sibling (e.g., baby brother, etc.) figures which were flexible (could be made to sit, stand, lie, etc.) were also provided. *A felt board center* was equipped with materials which encouraged classification. The materials were presented in toy boxes as "shelf" toys. They included (a) an assortment of felt animals: zoo, farm, pet, (b) felt numerals (1 to 6) with duplicates for matching, (c) felt letters (A-E) with duplicates for matching, (d) felt shapes and colors suitable for matching and grouping.

Regular shelf toys. Commercial games which encourage the children to note similarities and differences and the relations among objects were also used, for example, the "go-together lotto" in which the children find the pictures that "go together" such as dog/doghouse, fish/fishbowl, and card games, such as "Fish" and "Old Maid," in which the children match cards by some distinguishing feature such as color. Non-commercial equipment was also used, such as jars and tops which varied in size and had to be sorted if the aim of the game was to "find the top for the jar" (the one that fit). Beads, buttons, nuts and bolts (easy to acquire, inexpensive materials) which generate sorting and classifying by color, size and/or shape, and materials which encourage sorting by texture (e.g., squares of carpet, silk, velvet, corduroy, etc.) were also provided.

Arts and crafts center. This center was organized so that it would encourage independence in carrying out self-selected plans. It had a rack of paste pots, a rack of scissors and other materials which were arranged in an orderly way, so that the children would know where everything was and could find it easily. Note that the scissors were organized, by category, and put in a special place—a demonstration of classification. In the children's art work, older preschoolers often undertook to make a poster, or a book, about their experiences on a field trip. If it was to a farm, they drew, or collected, pictures of the things they saw on the farm, and this often became an exercise in classification.

Science center. There was a permanent science center in the preschool and many of the materials placed there encouraged classification, such as objects which could be categorized by their properties (e.g., magnetic/non-magnetic; sinking/floating; metal/wood) and sorted by size (e.g., autumn nuts, seashells), color (e.g., autumn leaves), sound, smell or weight.

Group Activites (the Traditional Circle)

Songs and games, suitable for use with a group of young children, which draw attention to distinguishing features (e.g., color, shape, etc.) of objects and suggest grouping in terms of these features were used. For example, attention was sometimes drawn to the color of the children's shoes (who has red shoes, who has brown ones, etc.). The teacher would invite everyone with brown shoes to go into the middle of the circle and jump (or dance), while the other children sang:

> "See the children jump in their little brown shoes
> Their little brown shoes, their little brown shoes
> See the children jump in their little brown shoes
> Hi-di-diddle-ee-io."

The game was then repeated with those who had red shoes (black shoes, etc.).

Another example of a color-song game is as follows. Each child is given a circle. The circles vary in color (red, yellow, green or blue). The teacher has a complete set of circles (one of each color distributed).

The game begins with a song, sung by the teacher:

> "I have some colors, you do too
> Red, yellow, green and blue
> If your color is the same as mine
> Come and have a happy time."

The teacher holds up her *red* circle and invites the children with a circle which is just the same as hers to go into the middle of the group and dance. While they dance everyone else hums the tune of the song and claps. When the "red-circle" children have finished dancing, she holds up her yellow circle (then her green one and blue one) and each time repeats the procedure until all of the children have had a turn.

At festival times (e.g., Christmas, Valentine's Day) the shapes can be bells or hearts. This game can also be played with shapes (square, circle, triangle) instead of colors. It can also be made more difficult for older preschoolers by varying both shape and color. The children will find it more difficult to decide whether their *shape* is the same as the teacher's if it varies in color, or their *color* is the same as the teacher's if it varies in shape, but the difference between shapes and colors is emphasized in this exercise.

Games like the above were used for "breaking-up" (dismissing) a group, in a slow-paced way (i.e., the children with red shoes danced and then it was "their turn" to go off to the next activity).

Themes for group time and discussion were planned so that "classes" and their distinguishing characteristics could be emphasized. If the children had been on a field trip to a farm, animals were discussed (i.e., the ones they saw as well as other kinds of animals—farm, zoo and pet). Cows were sometimes classified by color or by purpose (e.g., dairy, beef). Pictures of animals or miniature animals were used and the children were encouraged to find examples of specific types of animals. Discussion about animals was sometimes extended to differentiating those that live on land and those that live in the water and this sometimes led to considerations of the differences between animals and fish and even birds.

If a dentist had visited the preschool to talk to the children about the care of their teeth and how the food they ate might affect the health of their teeth, the teacher followed this up by having the children classify food into "sweet things" (that may harm teeth) and "food that is not sweet" (that will not harm the teeth). Pictures cut out of magazines (e.g., of chocolate cake, candy, carrots, celery, etc.) were used as materials. A picture was distributed to each child. The teacher started by showing a picture of a food which was sweet (e.g., chocolate cake which has lots of sugar in it and may be harmful to teeth) and initiating a discussion about it. She then placed this picture on the floor in the middle of the group and showed a picture of a food which was not sweet (and not harmful to teeth). After a discussion of this food, the picture was placed on the floor beside the first. The teacher then asked each child in turn about his or her picture and whether it was of something sweet or something that was not sweet. The whole group was encouraged to participate in the discussion. Finally each child put his or her picture on top of one of the teacher's pictures (of a sweet or a not-sweet food), whichever was appropriate.

Individual or Small-Group Teacher-Guided Activities

Snack preparation. Most days some of the children helped prepare food for snack, and this often provided experience with classification. If something to bake was made, the children were helped to discover that some ingredients were "wet" and some "dry." If a fruit salad was made, the discussion would focus on "fruits," how they are the same and different, and how "fruits" differ from "vegetables." The taste of food (e.g., sweet, sour) was sometimes made the focus of attention and the children were encouraged to think of all the kinds of food that are "sweet" or the kinds that are "sour."

Special activities. "Special" activities are ones which were planned for use in small groups or with individual children to promote the development of the abilities described in the Guide. Some examples of these follow. For each, both the Level and the specific kinds of abilities to be assessed (or encouraged) are described.

Special Small-Group Activity #1

AREA Classification

LEVEL 1 (object level)

Purpose:

to determine the child's ability to classify objects by common association

Materials:

(a) five pairs of objects which are commonly used together in the child's experience (e.g., soap-facecloth, hammer-nail, etc.)
(b) a box which contains the objects

Procedure:

The child is presented with the box containing the objects and invited to choose something from it and to name it. The teacher then says, "Can we find something in the box which goes with this?"

As the game proceeds and the child succeeds in matching objects, the way in which they are related is discussed.

Special Small-Group Activity #2

AREA Classification

LEVEL 1 (object level)

Purpose:

to assess the child's understanding of "same," "different"

Materials:

(a) two identical three-object sets each consisting of (for example) a spoon, a toy car, a crayon

(b) a shoe box with a hole in the lid big enough so that a child can reach inside and feel around, but not see what is inside

(c) four additional objects all different, none of which is like those in the three-object sets

Procedure:

One set plus two additional objects are placed in the shoe box. The teacher keeps the other set and the other two additional objects in a box in her lap.

The teacher takes one of the objects in her set, shows it to the child and explains that in the shoe box there is an object which is just the same as this one and says, "Can you find it?" She explains that the game is to find it by feeling the objects in the box. She demonstrates how the child can put his or her hand in the hole and she rattles some of the objects in the box.

If the child succeeds in matching all objects, the teacher then holds up one of her additional objects, which is not like any in the box, and says, "Can you find something in the box that is different from this one?" If the child does not understand "different" she repeats the question using "not the same."

The teacher then goes on to hold up another object, for which there is a counterpart in the box, and asks the child to find one that is "just the same," etc.

Special Small-Group Activity #3

AREA Classification

LEVEL 2

Purpose:

to assess the ability to match identical *pictures* and to understand "same" and "different"

Materials:

two identical sets of eight cards on which pictures of the following have been mounted: a lion, rabbit, duck, horse, ball, butterfly, flower, boy

Procedure:

One set of cards is placed picture side up, in a row on the table, in front of the child. The teacher then draws a card from the second set and asks the child what it is (i.e., to label it). She then says, "Can we find one just like this?" (pointing to the row of pictures on the table). If the child succeeds in matching the first picture to its counterpart, the teacher draws a second card, asks the child to name the object and then to find one just like it. If and when all the pictures are matched, all 16 of the cards are turned upside down, mixed up and then the child is asked to draw two cards to see if he "is lucky" and draws two that are the same. The child is told that the rule of the game is that if he or she draws two cards that are the same, he or she may keep them, but if they are "different" they must be put back, picture face down, on the table and the child can try again. The game can continue until all the pairs of cards that are the same have been matched.

Resources for Teachers

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Appendix A

MANUAL FOR THE UWO LABORATORY PRESCHOOL CLASSIFICATION ABILITIES ASSESSMENT AND CURRICULUM GUIDE

General Instructions

When attempting to assess children's abilities, or to promote the development of new abilities, the approach of the teacher should be *informal*. Although each item in the Guide is described as a task, the teacher should avoid creating a "test-like" situation. The children's abilities should be assessed or promoted when they are engaged in game-like, curiosity-inducing activities in which they are clearly interested and which they are clearly enjoying. Some abilities may be assessed during free play, but others will require observations made in small groups (two or three children) or in sessions with only one child.

The focus of the teacher should never be on "right" or "wrong" answers, but on creating a situation in which the child experiences the fun of trying something new and the joy of working together with a teacher at "figuring something out." Children should never be pressured into performing the tasks and their responses should be accepted and never criticized. If a child is not able to understand or master a task the game should be changed to an easier one, so that a child will not leave the situation with the feeling that he or she failed.

Some children find it difficult to respond to direct questions. With such children direct questions should be avoided. The teacher should put the onus to respond on herself by saying, "*I* wonder which of these is the same as that one" or "Let's see if we can find, etc. . . ."

LEVEL 1 (object level)

1. Child matches objects commonly associated. The child selects from among a group of objects ones that "go together" such as toothpaste and toothbrush. This type of ability is a pre-classification skill which may be one of the most primitive. The objects must be ones which, in the child's experience, are frequently used together in a functionally meaningful way.

   Materials: Five pairs of real objects: pail-shovel, spoon-bowl, paper-pencil, toothbrush-toothpaste, soap-towel.

   Procedure: The ten objects are spread out before the child in an array. The teacher says, "What have we here?" and encourages naming of the objects to make sure the children know what each one is. She then says, "Let's see if we can find the ones that go together."

2. Child chooses "same," "not the same" and "different" (three-object set; one dimension varied; receptive language).

   Materials: (a) Three *square* parquetry blocks, identical in size but varied by color (two red, one blue); (b) Three parquetry blocks, identical in color but varied by shape (two red squares, one red triangle)

   Procedure: (a) The teacher places the three square blocks in front of the child in a row with the blue one in the middle and says, "Let's find the ones that are the same—can you pick them out?" If the child succeeds, the teacher replaces the blocks in the row and says, "Can you find the one that is different?" If the child does not respond to "different" she repeats the question using "not the same" (the child may respond by pointing rather than by picking up the blocks). (b) The teacher repeats the above procedure with the second set of blocks.

   Curriculum Note: When promoting an understanding of same-different, more interesting materials may be used (e.g., three identical cars which vary by color, two red, one blue), but the children may find objects like cars so interesting that they distract them from the same-different problem.

3. Child sorts nine-item set of objects which are identical except on one dimension.

   Materials: (a) Nine square parquetry blocks, identical in size but varied by color (three red, three blue, three yellow); (b) Nine wooden or plastic shapes, identical in size and color but varied by shape (three red squares, three red circles, three red triangles); (c) Three similar boxes into which the objects can be sorted.

   Procedure: (a) The teacher places the first set of objects (described in [a] above) in an array in front of the child and says, "Let's see if we can sort these blocks and put the ones that are the same in this box" (pointing to one of the boxes). If the child chooses any two blocks which are the same color, and then hesitates, the teacher can provide encouragement and say, "Are there any more that look the same as these?" Children who complete one sort (e.g., by red) may wish to continue and complete the sorting by blue and yellow. (b) The procedure with the second set of materials is the same as with the first.

   (*Note:* This task may also be used to assess the child's understanding of "different" and "not the same.")

LEVEL 2 (representational)

1. Child matches pictures of objects which are commonly associated. (This is the same as the #1 task at LEVEL 1 except that *pictures* of objects rather than real objects are used.)

   Materials: Ten index cards (approximately 8 x 12 cm) with pictures of real objects mounted on them. The pictures can be cut out of magazines and pasted on the cards, but they should be approximately the same size.

   The ten pictures (five two-picture sets) are of the following: pail-shovel, spoon-bowl, paper-pencil, toothbrush-toothpaste, soap-towel.

   Procedure: The ten cards are spread out, face side up, in an array in front of the child. The pictures must be oriented properly for the child (i.e., right side up). The teacher begins by making sure the children recognize the objects and can name them. She then says, "Let's see if we can find the ones that go together."

2. Child chooses "same," "not the same," "different" in *one* three-item set of pictured objects, one dimension varied, receptive language (this is the same as the #2 task in LEVEL 1 except that *pictures* of objects rather than real objects are used.)

   Materials: Two sets of three cards (index card size) with shapes painted on them as follows: (a) Set 1: three squares of same size but different color (two red, one blue); (b) Set 2: two squares, one triangle all the same color.

   Procedure: The teacher arranges the cards in Set 1 in a row in front of the child with the blue square in the middle and says, "Let's find the ones that are the same." If the child succeeds, she asks, "Can you find the one that is 'different' or 'not the same'?" The teacher then repeats the procedure with the second set of cards, presenting them in a row with the triangle in the middle. The teacher may then present either set of cards again, arranging them in a different order (e.g., red, red, blue) and repeat the questions.

3. Child chooses "same" and "different" in *three* two-item sets of pictured objects, one dimension varied, receptive language.

   Materials: Six cards (index size) with a line drawing of a face on each. The faces are identical, except that two are smiling (☺ ☺), two are frowning (☹ ☹) and two are neither smiling nor frowning (😐 😐).

   Procedure: The six cards are placed in front of the child, face side up and right side up, in an array. The teacher encourages a brief discussion about the fact that the pictures are of faces. She then says, "Let's find the ones that are just the same." If the child matches the faces, she picks up one card (any one) and says, "Can you find one that is different from this one?" If the child hesitates, she repeats using "not the same."

4. Child sorts represented objects (paper cutouts) that vary on two dimensions (color, shape) and decides independently which attribute to use.

   Materials: (a) Nine cutouts all the same size but different in shape and color as follows: three circles (one red, one yellow, one blue), three squares (one red, one yellow, one blue), three triangles (one red, one yellow, one blue); (b) A pail, dishpan or large box (make-believe pond); (c) Nine paper clips (one clipped to each cutout); (d) A fishing pole: stick with a strong string attached which has a magnet tied at its end; (e) Three tin cans.

   Procedure: This task is presented as a fishing game. The cutouts with the paper clips attached are spread out on the bottom of the pail. They can be picked up by the "magnetized" fishing pole. The teacher says, "In this game we pretend that we are fishermen." "Here are all the fish" (pointing at the cutouts in the pail). "There are a lot of different kinds of fish in there." "Do you think you could catch them and sort them out into these fish cans?" (pointing to the three cans). The teacher then demonstrates how the fish can be "caught" with the pole and lets the child practice fishing for awhile. She then repeats her question (instructions): "Can you sort the fish out when you catch them and put all the ones that are the same together—in these cans?" Any sort is acceptable. The critical question is whether the child can decide on a sorting principle and maintain that principle to complete one sort (i.e., sort by color and ignore shape, or sort by shape and ignore color).

5. Child sorts objects by inference (tools and "things that float") and excludes objects from a category or class (i.e., identifies objects which are *not* tools). Note here that *real* objects (not pictures of objects) are used. Also this task can be presented so that only receptive language is required, but it provides opportunities for exploring the child's productive language ability.

   Materials: (a) Tools: a hammer, saw, screwdriver, toy car, banana, shoe (six objects); (b) Things that float: water tank or large basin of water, small wooden block, toy boat, a square of styrofoam, toy metal car, handful of pebbles, metal spoon (six objects).

   Procedure: (a) Tools: The teacher shows the children the six objects, stimulates a discussion about each one and how they are used and introduces the word "tool." She then asks, "Do any of these objects belong together?" "Which ones belong together?" "Let's see if we can find the ones that go together and put them over here."

If the child sorts out the tools the teacher may then say, "I wonder why you put all these together?" and later, "What are they all called?" If the children are unable to answer, the teacher explains that they are all tools. The teacher then picks up an object which is not a tool and says, "Is this a tool?" "Can we find one that is not a tool?"

Curriculum Note: When promoting the understanding of the children, discussion of the answers to these questions is encouraged.

(b) Things that float: The teacher shows the children the materials and initiates a discussion about them. She then says, "I wonder what will happen if we drop them in the water." "Would you like to put one in the water, Billy, and find out?" The child or children and teacher take turns dropping the objects in the water and the teacher encourages a discussion of sinking and floating and some of the reasons why some objects sink and others float. The objects are then taken out of the water and spread out in an array on the floor or table and the teacher asks, "Are there some things that go together here?" "Can we pick out the ones that go together?"

If the child groups the ones that floated (or the ones that sank), the teacher may go on to ask, "Why did you put all these things together?" and may then go on to explore for the ability to understand class inclusion and exclusion using the procedure described above. Note that LEVEL 2 children may not be able to explain their sorting principles even though they have successfully sorted the objects into tools, or into objects that float. They may understand class inclusion and exclusion but not be able to explain it.

6. Child sorts *pictures* of objects by inference (tools). This is exactly the same as the #5 task described above except that pictures of the tools are used instead of real objects. Pictures of the tools are mounted on index cards (hammer, saw, screwdriver, truck, book, boot). The *procedure* is the same as that described in #5 above.

   Curriculum Note: A variety of interesting materials can be used when stimulating children to sort by inference (e.g., transport, or "things we ride on" could be the category). The pictures would then be of a car, a boat, a train or airplane, and of objects that we do not ride on (e.g., telephone, doll, house).

7. Child sorts *objects* by size (one dimension varied, receptive language).

   Materials: Nine rectangular unit blocks identical except for size: three large blocks (45 cm long); three middle-sized blocks (30 cm long); three small blocks (15 cm long).

Procedure: The blocks are spread out in front of the child in an array. The teacher picks up one of them and says, "Can you find another one just like this one?" If the child succeeds she then says, "Let's put all of the blocks that are like these two over here." When all three blocks are sorted out she then asks, "Why do these all belong together?" She then says, "Let's find some more blocks that belong together." Note (a) that the child must recognize the sorting principle (i.e., size, although the teacher does *not* mention size); (b) that the child may sort the objects by size but not be able to explain the sorting principle.

8. Child sorts *pictures* of familiar objects into sub-sets by inference.

Materials: Six index cards with pictures of animals mounted on them: three farm animals (cow, horse, pig); three zoo animals (lion, elephant, monkey).

Procedure: The teacher presents the pictures to the child in an array making sure that they are oriented properly (right-side up) and, pointing to one of the pictures, says, "We have a lot of pictures here. What is this?" Together, teacher and child examine each picture and identify each animal by name. The teacher then says, "Some of these animals belong together and some of them don't. Let's see if we can find the ones that belong together."

If the child puts all the farm (or zoo) animals together, the teacher may say, "I wonder why you put all those animals together" (probes for the ability to explain the sorting principle).

9. Child sorts 12 shapes, which vary on two dimensions, into sub-sets and then re-sorts one sub-set.

Materials: 12 cutout paper shapes, all approximately the same size, but varied by color and shape: six squares (three red, three blue); six circles (three red, three blue).

Procedure: The teacher spreads out the 12 shapes on the table (or floor) in front of the child and says, "We have a whole lot of shapes here" (pointing to several of them). "I wonder how we could sort them out?" "Would you like to find the ones that belong together?" "You could put them over here" (indicating some empty space to one side of the child). The child is left to decide on the sorting principle independently.

If the child succeeds in sorting by either shape or color, the teacher commends the child's efforts and then removes the six shapes not sorted out, pushes the pile of six shapes which have been sorted out toward the child and says, "Now is there any other way you can sort these shapes?"

LEVEL 3 (ADVANCED)

1. Child sorts pictures of shapes which vary on two dimensions into sub-sets, then re-sorts and explains sorting principles.

   Materials: (a) 12 pictures of objects, mounted on index cards which vary in shape and color: six squares (three red, three blue), six circles (three red, three blue); (b) two sheets of white paper (approximately 21 x 28 cm).

   Procedure: The teacher proceeds as in task #9 at LEVEL 2. She spreads out the cards, face side up, in front of the child and says, "We have a lot of shapes here." "I wonder how we could sort these out." "Would you like to sort them?" "When you find some that go together you could put them over here" (indicating one of the sheets of paper which is placed to the child's right). "If you find some others that go together you could put them over here" (indicating the other sheet of paper). The child is left to decide on the sorting principle independently.

   If the child completes a sort (e.g., by color) the teacher says, "Why did you put all these together?" Whether the child can explain or not, the teacher later says, "Now is there any other way we could sort them out?" She pushes the 12 cards off the sheets of paper toward the child and repeats, "Is there another way?" etc. (Note that in this task the child chooses the principle by which to sort, then remembers the principle and applies it over an extended period of time while ignoring a second variable. Finally, the child recognizes an alternative principle which could be applied and re-sorts on the basis of that alternative.)

   If the child succeeds in doing the second sort using the alternative sorting principle, the teacher asks, "Can you tell me why you put all of these together?"

2. Child takes a class apart by separating items into sub-classes and makes all-some comparisons.

   Materials: 20 nuts (7 walnuts and 13 peanuts).

   Procedure: The teacher presents the nuts to the children in a pile and says, "Now what do we have here?" In the discussion which follows, she elicits, if it does not come spontaneously, the name of the class "nuts." "Yes, these are all nuts." "But what else do we call this one?" (pointing to a walnut). "And what else do we call this one?" (pointing to a peanut). In this way she elicits the names of the sub-classes.

The teacher then says, "Now let's think some more about what we have here." "They are ___ (waits for response *all* and offers it, if not given) nuts, but ___ (waits for response *some,* and offers it, if not given) are walnuts and ___ *(some)* are peanuts." The teacher repeats this statement to see if the child will give the appropriate responses on the second try (i.e., all-some).

The teacher then says, "Do we have more peanuts or more walnuts?" "Can you put all the walnuts over here (points to an area to the right of the child) and all the peanuts over here (points to an area to the left of the child) and maybe we can find out?"

If the child accomplishes the sorting task, the teacher asks again, "Do we have more walnuts or more peanuts?"

3. Child can keep two properties of an object in mind when classifying into sets and can use these two properties when choosing an object or picture to complete a set.

   Materials: Five pictures of objects mounted on index cards: yellow banana, yellow pear, red apple, yellow lemon, yellow car.

   Procedure: The teacher places the yellow banana and yellow pear in front of the child and says, "I have two pictures here. Can you tell me what they are?" The child is encouraged to label and describe the objects in the pictures. She then presents the other three pictures and says, "One of these pictures belongs with those two pictures" (pointing to the two pictures the child already has). "Can you pick it out?" (The child must keep the property of color and the class, fruit, in mind when choosing the correct picture, i.e., the yellow lemon.)

Appendix B

THE UWO LABORATORY PRESCHOOL CLASSIFICATION ABILITIES ASSESSMENT AND CURRICULUM GUIDE RECORD OF PERFORMANCE FORM

Child's Name: ______________________

Marking Code

✓ Child understands (performs correctly)
X Child does *not* understand
? Teacher is not sure of degree of understanding
# Comments on reverse side

	YEAR					
	DATE					
	GAME (number)					
	TEACHER					
LEVEL 1 (object level) 1. matches objects by common association (5 pairs)						
2. chooses "same" and "different" (3-object sets; one dimension) (a) 3 *square* blocks (2 red, 1 blue)	· same					
	· not the same					
	· different					
(b) 3 *red* blocks (2 square, 1 triangle)	· same					
	· not the same					
	· different					
3. sorts 9-item sets on *one* dimension (color, shape) (a) 9 *square* blocks (3 red, 3 blue, 3 yellow) Sorts out one set (e.g., the red ones)						
(b) 9 *red* shapes (3 squares, 3 circles, 3 triangles) Sorts out one set (e.g., the squares)						
LEVEL 2 (representational level) 1. matches *pictured* objects by common association (5 pairs)						

2. chooses same-different (pictured objects, *one* 3-item set, one dimension varied, receptive language)	- same					
	- not the same					
	- different					
3. chooses same-different (faces) (pictured objects, *three* 2-item sets, one dimension varied, receptive language)	- same					
	- not the same					
	- different					
4. sorts 9 cutouts (fishing game) (2 dimensions varied, receptive language)						
5. sorts *objects* by inference (6 objects, receptive language; class inclusion and exclusion	- tools					
	- not tools					
	- explains principle					
	- things that float					
	- things that don't float					
	- explains principle					
6. sorts *pictured* objects (tools) by inference, 6 pictures, receptive language, class inclusion and exclusion	- tools					
	- not tools					
	- explains principle					
7. sorts 9 objects by size 3 large blocks, 3 medium-sized, 3 small	- sorts					
	- explains principle					
8. sorts *pictures* of familiar objects into sub-sets by inference 6 items (2 sub-sets) receptive and productive language	- sorts					
	- explains principle					
9. sorts 12 shapes which vary on two dimensions into sub-sets and then re-sorts one sub-set 6 squares (3 red, 3 blue) 6 circles (3 red, 3 blue) receptive and productive language	completes 12-item sort					
	completes 6-item sort					

LEVEL 3—ADVANCED (productive language)							
1.	sorts pictures of shapes varying on two dimensions—explains principle						
	re-sorts pictures on alternative principle—explains principle						
2.	takes a class apart	separates walnuts and peanuts					
	makes all-some comparisons	understands "all"					
		understands "some"					
		solves "more" question					
3.	keeps two properties in mind when classifying into sets						

Appendix C

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5

Helping the Preschool Child Develop Knowledge About Spatial Relations[1]

Children aged three to five years are beginning to develop some rudimentary knowledge about spatial relations. They typically understand and use some *locative* terms, such as "in" and "out," which describe where an object is in space. They also understand and use some *directional* terms, such as "up" and "down," which describe the way an object is moving through space.

Learning about spatial relations is in part a conceptual and in part a semantic task. The child must develop concepts of "in-ness" and "out-ness" and "up-ness" and "down-ness" and then learn the words, in-out, up-down, which express these concepts. The concepts to be acquired are relational. "In-ness" describes where an object is by relating it to some other object. For example, in the statement "the cat is *in* the basket" the location of the cat is pinpointed by specifying its relation to the basket (i.e., in). "Up-ness" describes the way in which an object is moving, relative to a fixed point (e.g., the ground) and is understood in terms of its opposite "down-ness." Acquiring a real understanding of spatial relations is, therefore, a cognitive task which is a challenging one for preschoolers.

Simple "direction-of-movement" words appear very early in the vocabularies of young children. The two-year-old who says, "Up, Up, Mommy!" is declaring very clearly where he or she wants to go. It has been suggested that such words come first, because they are "action" words, used in functionally meaningful situations which are exceedingly important to the child motivationally. However, the ability to *understand* directional and locative words spoken by others (receptive ability) develops before the ability to *use* such words appropriately (productive ability).

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[1] This chapter was written in close collaboration with Sandra Gatt who was a teacher in the preschool from the beginning to the end of the project. She was trained at the University of Western Ontario and has a BA in psychology.

Young children often puzzle teachers because they seem to understand certain spatial relations terms in some situations, but not in others. One reason for this is that they are able to understand them first when they refer to themselves, next when they refer to other people, and finally when they refer to impersonal objects. In other words, children can follow directions and make *themselves* go *down* the slide and hide *under* the table relatively early. Later, they can identify the child who went *down* the slide and is *under* the table, and later still they can make the truck go *down* the hill and find the block that is *under* the table.

Also, certain terms such as "up" and "down" which are polar opposites appear to be understood in a directional sense before they are understood in a locative sense. In polar-opposite word-pairs there is usually a positive and negative term. For example, in big-little, "big" is the positive term and "little" is the negative term. "Big" implies more (hence desirable), and it tends to be used more frequently than "little" (we say the next biggest more often than we say the next littlest). Hence, positive terms become more salient for children and are usually understood in advance of their negative opposites. When children are just beginning to understand polar-opposite word-pairs they appear to recognize that the words are related and refer to the same concept (e.g., big-little refers to size, inside-outside to location), but they may equate both words with the positive end of the dimension and apply the negative term inappropriately. This may account in part for their difficulty in using such terms in a locative sense.

Certain locative notions are particularly difficult for preschoolers to grasp. Two of these are "in *front* of," and "in *back* of" or "*behind*." The problem with these may be more than that they are opposites. What is the *front* and what is the *back* of an object may be ambiguous, since it can change, depending on the location and perspective of the child. Concepts of "right" and "left" are also extremely difficult for the young child to grasp and are rarely understood at the preschool level.

Finally, the ability of young children to deal with spatial relations terms is affected by the *representational demands* of the task. They are able to deal with them in real concrete situations in which they are manipulating themselves, real people and real three-dimensional objects, before they are able to do so in represented situations (as in pictures) in which symbols of people and objects are used.

The UWO Laboratory Preschool Spatial Relations Assessment and Curriculum Guide (see Appendix A) was developed to help the teachers assess the children's present abilities in the spatial relations area and to suggest abilities which they might be ready to acquire. Its purpose was, therefore, to solve the problem of the "match" so that the challenges offered the children would be appropriate in difficulty. In developing the Guide, relevant scientific literature was used, but this was sparse and the research findings were inconsistent. This literature did, however, provide suggestions on which the preliminary version of the Guide was based. The final Guide, described here, was, however, based primarily on our experience with the children in our own preschool.

In this chapter we provide a very brief description of the Guide. We then discuss the ways in which we attempted to promote the acquisition of spatial relations concepts and abilities in the children and include examples of specially designed activities and games which we used for this purpose. We also suggest other resources for teachers.

Included in the appendices, in addition to the Manual for the Guide (Appendix A) is a Form for recording the developing abilities of an individual child (Appendix B) and a list of references to the research literature which we found useful in developing the Guide (Appendix C).

THE GUIDE

The Guide provides for assessment at two levels: LEVEL 1 (typical of most three-year-olds) and LEVEL 2 (typical of most four- and five-year-olds). At LEVEL 1 only receptive language ability is expected and the tasks involve only real people and real three-dimensional objects. Understanding is inferred from the children's ability to follow directions and place themselves (or objects) in specified locations, and to indicate by pointing or gesture which person or object is positioned in a specified location. At LEVEL 2 productive language is expected and, as well, the ability to deal with represented situations.

In the Guide it will be noted that many of the words to be understood are the same at both LEVELS 1 and 2. This is because the difference between older and younger children lies not entirely in the concepts and words to be acquired, but in the ability (a) to *produce* the words as well as understand them, (b) to recall and produce the words in *represented* as well as in concrete situations and (c) to use the words in both a "directional" and "locative" sense.

ACTIVITIES FOR PROMOTING THE ACQUISITION OF SPATIAL RELATIONS CONCEPTS

Opportunities to acquire knowledge about spatial relations were provided in three parts of our preschool program: free play, group activities (large or small groups) and individual teacher-guided sessions.

In March and early April the focus in the small groups (and individual teacher-guided sessions) shifted to spatial relations. During that time more games and songs that dealt with direction and location were used in the larger teacher-guided group activities (circles). Also a more conscious effort was made to introduce new materials in the play areas which would stimulate conversations involving spatial terms and present the child with spatial relations problems.

Free Play: Equipment in the Play Area

Equipment which generates more active, physical play, especially the kind that can be provided on an outdoor playground, provides excellent opportunities for acquiring concepts about space and the relations among objects in space. Our playground was equipped with a bicycle path, tunnels, climbing equipment, teeter-totters, slides and the like, which induced movement in various directions and changes in location which the children enjoyed and soon wanted to talk about. The teacher's role was to help the children communicate by, at teachable moments, making statements which described how they were moving and where they were located (e.g., "Well, you did climb *up* very high today!" "Isn't it fun to stand up *on top* of the big climber!" "Did you go *through* the tunnel yet?" "I see Billy going *in* now and look—John is just coming *out*.").

In certain centers in the preschool, such as the handicraft or creative art center, the materials were organized and located so that opportunities would be provided for the teachers to use locative terms and present the child with real-life locative tasks. For example, the scissors rack was located *between* the paste pots and the paint pots so that the children would learn the meaning of between. The paint brushes were stored *beside* the paint pots, and the paste brushes *in* the paste pots and so on. A well-organized center in which everything has its place and that place is always the same, not only reduces frustration because everything is easy to find, but allows the children to become independent and helps them acquire concepts of, for example, "between-ness" and "beside-ness," and the terms which describe these concepts.

Most preschool centers, if organized in a systematic, consistent way, provide many opportunities for the children to hear and use locative terms (e.g., "The records are *on* the shelf *below* the record player." "The firetrucks are *on the top* of the counter *in* the block center," etc.). Also, in informal friendly conversations the teacher can encourage the children to use descriptive directional words. She could say to a child on arrival: "I'm wondering *where* you are going to play today?" or while looking at a poster with a child, she might say, "I am wondering what these people are doing? Let's guess."

Dramatic play centers which stimulate the spontaneous enactment of stories in which the characters move in specified directions and locate themselves in specified places, also give the children experience in hearing and using directional and locative terms in meaningful situations. Stories especially useful for this purpose are "The Three Billy Goats Gruff," "The Three Bears" and "Bears in the Night." Extensive use was made of dramatic play centers of this kind in the preschool.

A block center also has the potential for creating awareness of spatial relations. Play which involves setting up a highway and locating service stations and the like in appropriate places and then driving cars on the highway stimulates thinking and ultimately conversation about where the cars are going *to*, where they are *at*, etc. Block play often evolves into a primitive kind of mapping behavior. This type of play was encouraged in the preschool.

Room decorations can be selected which "teach" the children about spatial relations such as pictures of Humpty Dumpty sitting *on* a wall and Miss Muffett with the spider *beside* her.

Once the teachers became aware of the kind of guidance children needed in the spatial relations area they found many opportunities to provide it in informal "teaching on the fly" ways.

Group Activities (the Traditional Circle)

Many of the old familiar songs which children have enjoyed for many generations help inform them about spatial concepts and terms. Examples are "Go In and Out the Window," "Ring Around the Rosie," "Drop the Hankie," "Circle Left-Circle Right." A more modern one is "Doin' the Hokey Pokey," but there are many others which can be found in the various songbooks which are now available.

Creative dance and creative movement activities stimulate thought about action in space. Being a cloud floating, or the wind swishing through the trees, or a bird soaring up and swooping down, or the little train that could, shunting backward and forward and struggling up the hill, are all both exhilarating and instructional representational activities for older preschoolers. There are many finger plays that are suitable for the younger children, such as the old familiar "Little Tiny Spider" who went *up* the water spout and then came *down* again with the rain.

Almost any group session can include discussions, or brief guessing games, which deal with the locations of the children. The teacher can say, "Who is sitting *beside* Sarah today?" If two answers are given (e.g., Billy *and* Amy—both correct) she can say "Yes, two people are sitting beside Sarah. Sarah is sitting *between* Billy and Amy. Now let's see if we can guess who is sitting between George and Betty, Harry and Joan," etc.

Stories such as were referred to earlier, which can be enacted spontaneously by the children in an appropriate play center, were usually introduced to the children in a teacher-guided group situation. Their first enactment of them occurred there (e.g., the story of "The Three Billy Goats Gruff"). At this time they received any help they needed from the teacher to understand what was meant by "going *over* the bridge" and other such terms.

A flannel board is also a useful aid in teacher-guided group sessions. As a story is told, the children (or teacher) can place flannel board representations of the characters and the objects in the story on the flannel board in appropriate positions relative to one another, or move them in appropriate directions as indicated by the story.

All of the above strategies were used in teacher-guided groups.

Individual or Small-Group Teacher-Guided Activities

Special activities were planned by the teachers to promote the development of the kinds of abilities described in the Guide. Some examples of these are given in the next few pages. For each of the special activities the level and the type of abilities to be promoted are indicated and the procedures to be used are described.

Special Small-Group Activity #1

AREA Spatial relations

LEVEL 1 or 2 (can be adapted for younger or older children by choice of terms used)

Purpose:

(a) at LEVEL 1—to assess or promote children's understanding (receptive language) of directional and locative words when they refer to themselves

(b) at LEVEL 2—to assess productive language ability

Materials:

one child-sized table, two child-sized chairs, a tunnel (or box)

Procedure:

The game is *Simon Says.* The teacher explains what Simon says we must do and that Simon thinks up great things to do. At LEVEL 1 the teacher is Simon. At LEVEL 2 the children can take turns at being Simon, but for LEVEL 2 the teacher will need to be Simon the first time to show how the game is played.

The teacher says (for example):

"Simon says, Billy get *up on* the chair
- Janie get *down on* the floor
- David go *into* the box
- Billy come *down* off the chair
- Janie get *on top* of the table."

LEVEL 2 children can be directed to

go *under,* climb *over,* go *around,* walk *between,* stand *in front,* sit *behind,* etc. (for "between," the chairs should be placed so that the child can walk between them).

Special Small-Group Activity #2

AREA Spatial relations

LEVEL 1 or 2 (can be adapted for younger or older children by choice of terms used)

Purpose:

to assess understanding (receptive language) of directional and locative words when they refer to themselves

Materials:

an "obstacle" course with equipment arranged in a circular pattern in the following order: (1) a climber, (2) a chair, (3) a large block, (4) a mattress or tumbling mat, (5) two stools that the child can walk between, (6) a tunnel, (7) a ladder (part of the climber)

Procedure:

The game is a *Follow the Leader* game. The teacher explains that the children can take turns being the leader, that she will tell the leader what to do and that everyone is supposed to try to do what the leader does.

When the leader is selected and the children are lined up behind the leader, the teacher starts:

"First go *in* the climber, then get *on* the chair, step *over* the block, walk *around* the mattress, go *between* the stools, stop *in front* of the tunnel, go *through* the tunnel, walk *behind* the teacher, go *up* the ladder, go *down* the slide."

Note that the teacher could read the children a story about sheep (animals which are followers) and the children could then play the game of *Follow the Leader* while pretending they are sheep or lambs.

Special Small-Group Activity #3

AREA Spatial relations

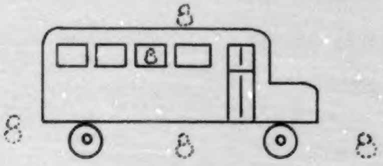
LEVEL 2

Purpose:

to assess or promote understanding of directional and locative terms when they refer to *represented* objects (receptive language)

Materials:

1. sheets of paper or cardboard, approximately 20 x 30 cms, on each of which there is a line drawing of a large bus (one for each child in the group). In addition to the line drawing, all locations of interest in the game are indicated on the sheet of paper by dotted lines as indicated below.



2. sets of six cutout kittens (one set for each child). The kittens should be small enough so that they will fit in the locations indicated by the dotted lines (see diagram).
3. a large cardboard "wheel" with a pointer mounted on it that will spin. The "wheel" is divided into five sections. In each section a different locative term is printed as follows: under, inside, on top, behind, in front.

Procedure:

The teacher mounts the cardboard "wheel" on a chair, hands each child a set of kittens, and says, "Today we are going to play a game called *Hide the Kitten*. The kittens want to hide, but they can't think of a good place to hide, but this board (pointing to the circle) tells of a lot of great places where a kitten could hide" (points to the words on the circle). She then says, "See these words—this one says *under*—that means that a good place for the kitten to hide is *under* the bus."

She then shows the children how the pointer works and how to spin it, lets them take turns at spinning it, and each time it is spun, reads out the word where the pointer stops. She then says, "Now let's play the game. Billy, would you like to spin the pointer so that we can find out where to hide our first cat?" The game can go on until all of the cats are hidden.

Note that this activity is set up like a multiple-choice task. Five locations are shown and the child chooses the one indicated by the locative term. To increase the challenge eliminate the "locations" on the bus.

Special Small-Group Activity #4

AREA Spatial relations

LEVEL 2

Purpose:

to assess and promote receptive and productive language abilities in the use of locative terms in represented situations

Materials:

Two sets of seven cards which are identical (i.e., the pictures on the cards in each set are the same). On each card in each set, there is a picture of a boy and a ball, but the location of the ball with respect to the boy is different on each of the cards. The locations of the ball are as follows: beside, behind, in front of, under, on top of (the boy's head), beside (to the left), beside (to the right).

Procedure:

The child (or children) are seated at a table with the teacher, and the teacher spreads out one pack of cards, face up on the table, so all seven pictures can be seen. She initiates a discussion about the positions of the balls in the pictures saying, for example, "I wonder where the ball is in this picture?"

She then says, "I have another pack of cards just like this one" and proceeds to spread out the second pack, face up, on the table. She lets the children look at them and encourages them to look for some cards which are "alike" or "just the same."

She then says, "We can play a new game with these cards, and I will show you how to play it." She turns all 14 cards upside down and shuffles them and then has each child draw four cards and the teacher draws four cards. From here on the game is played like *Fish.* The teacher explains that they should look at their cards and see if any of them are the same and if they are, they can be put down on the table; that the aim of the game is to find all the pairs of cards which are the same. She further explains to the child whose turn it is that if he or she does not have any cards which are the same, he or she can ask the child next to him or her for one. The teacher may need to model the type of question, "Do you have a card in which the ball is on top of the boy's head?" If the child who is asked for a specific card does not have it, the asker-child draws a card from the pack and it is then the second child's turn.

The game continues until all of the pairs of cards have been matched and placed on the table. This game is a challenging one for preschool children, and can be played only by those who have developed considerable productive language ability.

Note: Commercially available cards may be used (e.g., *Where Is It? Spatial Relations Cards* No. 2684. Ideal School Supply Co., Oaklawn, Illinois 60453).

If the "*Where Is It*" cards are used the game becomes a "matching" game (i.e., pictures are the same when the relation of one object to another is the same—boy *under* car and cat *under* table). This game is also a difficult one and suitable only for advanced preschoolers.

Resources for Teachers

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Songs

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Stories and Books for Children

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The Three Billy Goats Gruff

Appendix A

MANUAL FOR THE UWO LABORATORY PRESCHOOL SPATIAL RELATIONS ASSESSMENT AND CURRICULUM GUIDE

General Instructions

This is not a test and should not be used as a test. It is, as its name implies, only a Guide. In ordering the tasks within each level, an attempt has been made to sequence them according to their apparent difficulty (i.e., from easiest to hardest), but this has not been based on extensive normative data. It has been based mainly on data accumulated in our own preschool. Furthermore, there are wide individual differences in the ways that children develop in the cognitive areas, and their abilities are often uneven.

The teacher's approach, when assessing or promoting the children's abilities, should be informal. She should create play-like situations. Her focus should be on creating curiosity, in a game-like activity, and on making sure the children find working together with a teacher to solve a problem a truly enjoyable experience. A test-like situation should be avoided. Direct questioning should be minimized and there should be no emphasis on right and wrong answers. No coercive methods to persuade children to participate should be applied.

The assessment of some abilities may be made during free play, or when working with medium-sized or very small groups of children, but usually some individual sessions with each child will be required. In the Guide, procedures for assessing the children's abilities are suggested, but alternative strategies may be used. Some of them have already been described as special small-group activities.

LEVEL 1
Receptive language: real people; real three-dimensional objects.
Terms: in-out; up-down; on top; under.

1. *Subject reference:* Child understands directional and locative terms when they refer to actions to be carried out by the child on self (i.e., can follow directions and move self in specified directions and locate self in specified positions). For example, if the teacher says, "Could you climb *up* the ladder?" or if she says, "There is room for you *on* the wagon" the child would understand "*up*" and "*on*" and act appropriately.

Suggested Assessment Procedure. Understanding of these terms can often be assessed during free play, especially on the playground or on an obstacle course specifically designed for this purpose. If an obstacle course is used, care must be taken to avoid a set-up which suggests the direction in which the child should go. (See Special Small-Group Activity #2)

The teacher introduces the children to the obstacle course and describes the game. If there are two or three children it may be a "follow-the-leader" game. The goal is to see if the child can go through the course by following the directions of the teacher at each choice point. The teacher may use her ingenuity to make the game more interesting. She might read a story about a pony who performed at a horse show. The obstacle course could then become the ring in which the horses performed and the children could pretend they are horses (or ponies).

2. *Other person reference:* Child understands directional and locative terms when they refer to another person (i.e., can indicate by pointing or gesturing who moved in a specified direction, e.g., went *up* the ramp, and who is located in a specified position, e.g., who is *on top* of the play house).

   Suggested Assessment Procedure. These abilities can usually be assessed during free play periods on the playground or in an indoor area which provides opportunities for active play. An obstacle course may also be used.

3. *Object reference:* Child understands directional and locative terms when they refer to concrete three-dimensional objects. Thus, the child (a) can follow directions and move objects in specified directions (e.g., make the airplane go *up*) and place objects in specified locations (e.g., put the tray *on* the table); (b) can indicate by pointing or gesturing what object moved in a specified direction (e.g., what went *up*) and what object is located in a specified position (e.g., what is *in* the basket).

   Suggested Assessment Procedure. The teacher sets up, in advance of the session, on a table or on the floor, a road which has a hill, a bridge and a tunnel. At one end of the road is a garage with a truck in it. At the other end there may be a store or a house.

   The teacher begins the session by telling the child a story about a truck driver. She then asks the child if he or she would like to be a truck driver. She explains that she will tell the child where the driver has to go and that he or she can drive the truck there. The teacher then starts the story: "One day Mr. Jones, the truck driver, took his truck *out* of the garage (the teacher waits until the child reaches into the garage for the truck) to go to the store. He drove it *down* the road, *up* the hill, *down* the hill, *under* the bridge, *into* the tunnel, etc. The story can be elaborated to make it more interesting.

LEVEL 2

(a) Productive language, (b) represented situations.
Terms: in-out, up-down, on, on top, under-over, beside, to, at, around, through, between, in front of, behind, across, above-below, right-left (for new terms assess receptive ability first, see item 4 below).

1. *Subject reference* (productive language): Child produces appropriate directional and locative terms to describe movements and locations of self (i.e., the child states that he/she went *up* the ladder or is standing *on top* of the bridge, etc.).

   Suggested Assessment Procedure. A gymnasium situation is most satisfactory where the children can locate themselves in a variety of places and climb up and down and around and between things. The teacher explains the game, that she is going to play some music (piano or record player) and that while the music is playing the children can go anywhere in the room, and do anything they like (on the apparatus) but when the music stops everyone is to "freeze" and that then each child will have a chance to say where he/she went when the music was on, and where he/she is now.

   These abilities can also be assessed by having the children enact stories (e.g., "The Three Billy Goats Gruff").

2. *Other person reference* (productive language): Child produces appropriate directional and locative terms to describe the movements and locations of other people (i.e., the child states that Billy went *up* the slide or that Janie is hiding *under* the table, etc.).

   Suggested Assessment Procedure. The procedures described in (1) above can be used with the "rules" of the game changed (i.e., the children take turns being the active one, while the music plays). The other child (or children) watches. When the music stops, the observer-child tells where the active-child went, and where he/she is located now.

3. *Object reference* (productive language): Child produces appropriate directional and locative terms to describe the movements and locations of objects (i.e., the child states that the car went *down* the hill and that the pail is *in* the sandbox, etc.).

Suggested Assessment Procedure. A "guessing" game can be used in which the child is blindfolded while the teacher (or if it is a two-child situation, the other child) hides an object in a not-too-difficult place to find. Then the blindfold is removed and the child finds the object and tells where it was. For directional terms, the teacher can use a toy animal, doll or car, make it go through a series of movements and have the child "guess" where it went and what it did.

4. *Represented situations* (receptive language): Child can move representations of people and objects in specified directions and locate them in specified places (i.e., can follow directions and move *symbols* up or down, etc. and place them "under" or "beside," etc. as directed).

   Suggested Assessment Procedure—Materials: (a) Two cardboard cutouts, one of a mother bear and the other of a baby bear; (b) a sheet of paper, approximately 60 cm square that can be spread out on the floor, on which are pasted pictures of a door, stairs, a big stone, a car, two trees separated by approximately 6 cms, a bridge.

   Procedure: The teacher tells the child they are going to play a game with the two bears. She explains that she will read a story about the bears and that the child can make them do the things that the story says they do. She hands the bears to the child and begins to read the following story, encouraging the child to make the bears do what the story says:

   > "One sunny day, mother decided to take baby bear for a walk. Baby bear ran *to* the door and stopped *at* the door to open it. They went *out* the door and *down* the stairs. On the walk baby bear saw a stone and decided he could jump *over* it. Next, he walked *around* it and then sat *on top* of it. As they walked farther, baby bear spotted a car. He stood *in front* of it, then walked *behind* it to see if it was the same. Mother bear said to come along and they soon found two trees. Baby bear ran and stood *between* the trees while mother bear stood *beside* a rock. Then he climbed *up* the tree until he was scared and came down. He stood *under* a branch where he spotted a small bridge. After running to the bridge, first he stood *below* the bridge and then he went *above* it. But alas, supper time was getting close so mother and baby bear started back home."

   Note: The children may have difficulty walking the bear *in front of* and *behind* the car. They may put the bear *on* the car (for *in front of*) or try to pick up the picture to put the bear *under* it (for *behind*).

5. *Represented situations* (productive language): Child can *produce* appropriate terms to describe the direction in which *represented* people and objects move, and where they are located.

   Suggested Assessment Procedures. (a) The materials and procedures used in #4 above may be employed. When the story is finished the child can be encouraged to talk about where the baby bear went in the story and what he did: "Can you remember where the baby bear went—and what he did when he got to the rock?—and the trees?", etc. (b) Other excellent materials are pictures of the children themselves, or of other children in the preschool, taken on field trips or just in the preschool. If the teacher is working with only one or two children the snapshots can be used; for a larger group using slides and projecting enlarged pictures on a screen is more satisfactory. Such pictures produce much interest. The pictures should be taken so that they represent the directions and locations of interest. The teacher and child discuss the pictures and the teacher says, for example, "I wonder where Angela is in this picture?" "What do you suppose Billy was doing over there?"

6. *Ideational situations* (productive language): Child can use appropriate directional and locative terms to describe the actions and positions of self, people and objects which occurred at a time other than the present (i.e., can use the terms to describe events which occurred in the past, or which might occur in the future, including real events that did occur or might occur or events that took place in a story).

   Suggested Assessment Procedure. These abilities should be assessed informally in, for example, conversations with the children, on arrival (e.g., in the cloakroom) when they are often eager to talk about an event which has occurred at home or on the way to school. After a holiday, such as Christmas, they are likely to have much to talk about. Discussions following a field trip can also be used to assess the child's ability to talk about past events. Older children may also enjoy telling a story which is familiar to them to a group, while the other children enact the story. The more informal the situation, the more spontaneous and fluent the child is likely to be.

Appendix B

THE UWO LABORATORY PRESCHOOL SPATIAL RELATIONS ASSESSMENT AND CURRICULUM GUIDE RECORD OF PERFORMANCE FORM (LEVELS 1 AND 2)

Marking Code

✓ Child understands (performs correctly)
X Child does *not* understand
? Teacher not sure of degree of understanding
Comments on reverse side

Child's Name: ____________________
Date: ____________________ Year: ______
Game #: ____________________
Teacher: ____________________

LEVEL 1

Receptive Language Real People and Real Concrete Objects	TERMS						
	in	out	up	down	on	on top	under
1. understands when term refers to self (a) directional							
(b) locative							
2. understands when term refers to other persons (a) directional							
(b) locative							
3. understands when term refers to objects (a) directional							
(b) locative							

LEVEL 2 (see next page)
Check (✓) whether record continues into LEVEL 2: Yes___ No___

Child's Name ______________________

Date: ______________________

Game #: ______________________

Marking Code (for coding instructions, see LEVEL 1 form) Teacher: ______________________

LEVEL 2 Productive Language Represented People and Objects Ideational	in	out	up	down	on	on top	under	over	beside	to	at	around	between	through	in front	behind	across	above	below	right	left	
1. produces term when it refers to self																						
(a) directional											▨											
(b) locative										▨												
2. produces term when it refers to others																						
(a) directional											▨											
(b) locative										▨												
3. produces term when it refers to objects																						
(a) directional											▨											
(b) locative										▨												
4. understands term with represented objects (*Receptive language*)																						
(a) directional											▨											
(b) locative										▨												
5. produces term with represented objects																						
(a) directional											▨											
(b) locative										▨												
6. produces term when recounting or predicting events																						
(a) directional											▨											
(b) locative										▨												

Note: Squares are blocked out when the term cannot be used in a locative sense (to) or a directional sense (at)

Appendix C

REFERENCES TO THE RESEARCH LITERATURE

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6

Program Modifications and Special Studies

The work described in this chapter focused on the program itself rather than on its effects on the children. Initially, we made careful observations of what was actually happening in the program in order to find ways of improving it. Later, we continued to monitor what went on in the program to obtain objective information which we expected to need later when we began to interpret the results of the summative evaluations. A number of special studies were also done which examined variables in the program which we considered potentially critical. Some of these studies were exploratory and conducted without a high degree of scientific rigor, but others were carefully designed for specific research purposes.

As was stated earlier, the preschool program, as described in Chapter 2, was not fully implemented until the third project year. Therefore, we begin this chapter by explaining how the program differed during each of its first two years of operation and how and why it was changed after the first year and again after the second year. No further program modifications were made after the third year, and it was during the third and fourth project years that the more carefully designed studies, referred to above, were conducted.

PROGRAM MODIFICATIONS

The First Project Year

The first project year was also the "start-up" year for the preschool. Therefore, this year was different from any subsequent year in many ways. Everyone (children, parents, teachers) was "new" and there were more personal adjustments to be made. Policies and administrative procedures were not yet routinized and required time for debate. The program was in the organization and development phase and was under constant review. The first project year was a hectic year, full of challenge, but because of that, perhaps the most stimulating year of all.

The Play Environment

In the main indoor playroom, the arrangement of the centers was based on the principles described in Chapter 2, but some mistakes were made. First, a "novel" dramatic play center (a grocery store) was provided right at the beginning of the year, and was located on the side of the room in which the children made their entry, adjacent to the areas which were expected to induce more private, quiet and constructive play. Second, right at the beginning of the year, the centers were equipped lavishly and provided much novelty and variety.

The "novel" dramatic play centers which were introduced later in the year were located in the "change" center (described in Chapter 2) on the side of the room opposite to that in which the children made their entry, but these centers were introduced as a surprise. The teachers set them up after school and the children discovered them the next day. When presented in this way they generated much interest and excitement, but they also caused problems. More children than could be accommodated wanted to play in them and the frustration induced by this produced both aimless and disruptive behavior.

The initial design of the outdoor play area proved to be unsatisfactory. It induced dashing about. Organized play was often interrupted, collisions occurred frequently, and feelings, as well as excitement, often ran very high. Repeated attempts to re-organize this area continued to fail until early in May. It was then that it was finally designed and equipped in the way described in Chapter 2.

Finally, it is noteworthy that *all* of the children in the preschool were, initially, strangers to each other. None, as in subsequent years, had had a previous year in the preschool. Therefore, none knew the expectations of the school and provided a model for the inexperienced.

In summary then, the children who were in the program during the first project year were immediately dropped into a highly enriched, varied, novel, exciting and socially challenging environment.

Teacher Focus

During this year there was little time for the staff to discuss anything more than the attainment of the most fundamental goals (i.e., the social-personal ones). They spent the most time on defining immediate behavioral objectives in the problem-solving and cognitive styles area. This was the year during which the teacher rating scales for self-direction, mastery motivation, self-management, curiosity, creativity and imagination were developed. Everyone was reading literature on cognitive development and trying to utilize new information to stimulate the children's thinking during free play, but little individualizing of the program was accomplished.

Evaluations, First Year

The summative evaluations done at the end of the first year suggested that the program had been more effective in promoting social competence than in achieving other objectives. However, it had also been effective in improving self-management and cognitive styles but, in the latter area, the gains of the low-income children were greatest in imagination and least in reflectivity. In the intellectual and cognitive abilities area the low-income children made gains, but these were not as great as desired, especially in certain conceptual areas.

Staff impressions of the extent to which the immediate behavioral goals of the program had been achieved indicated that, for the low-income children, it had not been sufficiently effective in reducing distractability and increasing attention spans. The minutes of the staff meetings indicated that, as late as the spring term, the teachers were still struggling with the problem of inducing constructive behavior in the low-income children and were still manipulating the environment and the equipment in an attempt to do so.

Parent impressions of the effects of the program on their children were obtained near the end of the year by asking them to complete a Parent Report Form. The Form is presented in Appendix A. Forty-eight of the 50 families completed the Parent Report Form; of these, over 90% reported that their children had become more independent and had acquired new knowledge. Over 80% of the parents said their children were more capable of looking after themselves, more resourceful, better able to communicate with others, more imaginative and that they had developed new interests. Over 70% of the parents reported that their children were more self-confident, persistent, curious and creative and were more friendly and cooperative with peers. These reports may have been biased, for the parents were generally very enthusiastic about the preschool, but they were capable of giving less positive responses. For example, only 29% of the parents said that their children had become less self-centered and about half of them said that the newly developed independence and self-confidence of their children made them more difficult to manage at home.

The changes in the children most frequently noted by their parents were, in fact, consistent with the specified immediate goals of the program. Therefore, these reports contributed some support for the view that the program was achieving at least some of its goals in not only the personal-social, but also the problem-solving and cognitive styles area.

All of these findings, and impressions, determined the plans made for changing the program in the second year. The changes made were aimed at (a) reducing impulsivity and inducing more task-oriented behavior and (b) producing greater cognitive gains.

The Second Project Year

In the second year four types of changes were made. These were: (1) in the environment at the beginning of the year; (2) the times at which, and the ways in which, dramatic play centers were introduced and managed; (3) the extent to which cognitive stimulation was offered in preplanned teacher-guided sessions; and (4) the focus of the teachers, which began to shift to the attainment of the cognitive and intellectual goals.

The Environment

During the first five weeks of the second school year the number of centers in the main playroom was reduced to the six permanent ones described in Chapter 2. The space salvaged was used to increase the size of the permanent centers, especially the one which provided units of equipment which tended to induce more private, task-oriented play. The amount of equipment in the centers was also reduced during this period and no "novel" dramatic play centers were introduced.

Thus, the amount of novelty [illegible] variety was reduced at the beginning of the year. This change was based on the assumption that the environment had been too complex during the first year; that the variety of things to do had been distracting and that choosing and focusing had, therefore, been too difficult.

Dramatic Play

The induction of socio-dramatic play was an important immediate goal, because there was evidence suggesting that it not only helped children develop social problem-solving skills (Rosen, 1974), but also stimulated representational behavior and thinking, and thus promoted cognitive development (Piaget, 1962; Singer, 1973). Furthermore, other evidence suggested that disadvantaged children had difficulty in engaging in such play and needed help to acquire the ability to do so (Freyberg, 1973; Feitelson & Ross, 1973; Smilansky, 1968). In the second year, therefore, this part of the program was planned and managed with great care.

Late in the fall a start was made at introducing the children to the series of novel dramatic play centers that had been offered in the first project year (medical center, grocery store, post office, unisex hairdressing salon, restaurant). However they were not introduced as a surprise. They were preceded by field trips, or discussions with appropriate visitors, and the children made, or helped collect, props for the centers and took part in setting them up. The purpose of this procedure was more to give the children information about the roles and themes they could act out in the centers than to prevent the disruptive excitement caused by the "surprise" centers. However, it appeared to accomplish both of these aims.

Teaching strategies that would maintain and improve the quality of the children's dramatic play were also explored. Videotaped observations of the interventions the teachers used when the play broke down, or became disruptive, indicated that they were primarily disciplinary (e.g., "You are being too noisy and disturbing the other children" or "There are too many people in here. Billy, perhaps you would like to find something else to do"). A number of new strategies were therefore tried and their effects observed, again using videotapes which could be re-run and discussed. Teacher participation in the play was tried, but later abandoned because, although it maintained the play, the children tended to be over-stimulated, and to become dependent on the teacher. As soon as the teacher left the center the group would break up. Finally, the strategy which proved most effective and was, therefore, adopted in practice, was to help the children re-define their roles, help them remember what theme they had been acting out and get them started again. Some suggestions made by Smilansky (1968) such as addressing the children in their pretend roles (e.g., "Well mother, has the doctor treated your baby yet?") were also found useful for reactivating the play.

Small Groups

The teachers' time was scheduled so that they had an opportunity to work with the children individually or in small groups. However, the apparent differences in the cognitive abilities of the children were so wide that the teachers had difficulty knowing where to start with many of them. In October they tried using standardized tests to assess their abilities. These were some of the tests in the Circus battery which were not being used in the summative evaluations of the program. However, they did not find the tests helpful and they disliked the structure they imposed. Therefore, the tests were abandoned and the teachers spent the rest of the fall term looking for (in resource books) or creating, and trying out, games and activities which seemed likely to interest the children and challenge their thinking.

In January the teachers were asked to plan a series of small-group activities which might help 12 children, selected by the research team, who had very low scores on both the Concept Numerical and Associative Vocabulary sub-tests of the Preschool Inventory. They agreed to do this in February and at that time they worked with these children individually every day for four weeks. The children were split into two groups. One group received number stimulation and the other language stimulation in the first two weeks. This was followed by an assessment week during which the effects of the sessions on the children were measured by a member of the research team. Then the stimulation sessions were resumed with the group that had had number stimulation receiving language stimulation and the group that had had language receiving number stimulation. At the end of these two weeks the children were again assessed.

This exploratory exercise suggested a number of things. First, the children seemed to enjoy the sessions, and the post-treatment assessments suggested that they had gotten something out of them especially in "number." They also suggested that the number sessions had stimulated language just as much as the language sessions, but that the language sessions had not produced any improvements in number. This encouraged the thought that more might be accomplished if the focus of effort in the program was on the development of conceptual abilities rather than language. It suggested that as conceptual abilities improved, language development would also improve. However, the most important consequence of all of this was that it became abundantly clear that if suitable cognitive stimulation was going to be offered to individual children, more information about how to assess their developmental levels (to solve the problem of the "match") had to be obtained. The teachers were aware that some of the challenges they had offered the children had been inappropriate. It was at this point, therefore, that we turned to the scientific literature and began the work which led to the development of the Assessment and Curriculum Guides described in the three chapters preceding this one.

Evaluations, Second Year

The changes made in the design of the main playroom appeared to be remarkably effective. The amount of task-oriented behavior displayed by the children increased rapidly and was maintained throughout the whole school year, even when the number of centers and the amount of equipment in them became the same as it had been in the first project year. Also, the playground, which had been re-designed at the end of the first year, worked well and the amount of purposeful play which developed there was greatly increased. What has been reported here is based on impressionistic data, but these impressions are strengthened by the records of the minutes of the teachers' meetings which indicate that teachers spent no time during the second year struggling with the problem of how to reduce distractions and impulsive behavior in the children.

No doubt the ease with which the children were introduced to the program in the second year was due, in part, to the greater cohesiveness of the staff and to the fact that not all of the children were "new" to the school. It seemed highly likely, however, that the changes made in the way the program was implemented were the more important variables.

The summative evaluations in the peer social abilities area were puzzling. The children who were in their second year made greater gains than they had in their first year, but the children who were "new" in the second project year seemed not to have gained as much as the children (of the same age) who were "new" in the first project year. It appeared that the induction of more constructive play and the reduction of social conflict might have reduced the effectiveness of the program in achieving its social goals. However, the cognitive gains made by the low-income children were greater in the second than the first project year and the differences between the income groups (high and low) that were compared decreased rather than increased. Also, socio-economic differences in the tendency to be impulsive were more effectively reduced.

At this point it seemed acceptable to sacrifice some social gains in order to obtain greater cognitive gains. Therefore, the only major changes planned for the third year were to improve the procedures for individualizing the program in the cognitive areas and to increase the number of individual and small-group sessions.

The Third and Fourth Project Years

The program, as described in Chapter 2, was fully established by the third year and was not changed thereafter. In October the children in each class were divided into four sub-groups of seven and one sub-group was assigned to each of the four teachers for assessment and small-group work. The focus of the teachers was on strategies for fostering cognitive development and producing the Assessment and Curriculum Guides.

During the fall term a "novel" Christmas center equipped with a fireplace and Christmas tree was introduced, but this tended to induce only constructive play, such as making decorations for the tree. Novel dramatic play centers of the kind offered in the first two years were not introduced until the second week in January.

Monitoring the Program, Third and Fourth Years

By the third year a practical and efficient system had finally been devised for keeping records of when and what events occurred in each part of the program (field trips, visitors, special projects, introduction of equipment in the permanent centers, novel centers, other special centers, larger groups, special small groups and individual sessions), so that all activities could be monitored during the year, and a summary of what had occurred could be made at the end of each year. A practical procedure for recording when each child was involved in any kind of special activity, and the nature of that activity, had also been developed so that equality of opportunity in the program could be monitored throughout and at the end of each year.

Equality of opportunity. In interpreting the results of the summative evaluations of the program it was assumed that both the high-income and the low-income children had equal opportunities in the preschool. However, an attempt was made to verify this through attendance records, time-out-of-program to participate in research projects or other activities and time in individual or small-group teacher-guided sessions.

Attendance: The absenteeism rate was higher in the low-income than the high-income group. Illustrative figures for three blocks of time, chosen at random, were 12%, 15.7% and 15% for the low-income children and 9%, 10.3% and 8.9% for the high-income children. The low-income children were transported to school throughout the project, but the absenteeism problem persisted.

Involvement in research projects: The policy of the preschool was to permit the children to be involved in no more than four research projects during the school year and fewer if the number of sessions required by any project was large. The low- and high-income subjects participated equally often in this type of activity. Illustrative figures for one academic year were as follows: Mean number of projects 3.38 and 3.21 and mean number of sessions 20.5 and 20.6 for the low- and the high-income children respectively.

Out-of-program activities: About one third of the low-income subjects received treatments, lasting up to six months and sometimes more, for articulatory difficulties. None of the high-income subjects needed or received this treatment. These treatments were given by a professional (non-teacher) who sometimes worked with the children inside and sometimes outside the preschool. The number of sessions per week varied by child, but sometimes was as many as three, and each session lasted for 10 to 15 minutes. An attempt was made to schedule the sessions during the outdoor play period, but this was not always possible.

Time in individual or small-group sessions: The low- and high-income children participated in about the same number of small-group sessions. Frequencies will be reported shortly.

In summary, therefore, the low- and high-income children had about equal opportunities for participation in research activities and small groups, but the low-income children had less time in the program than the high-income children because of their greater absenteeism and more frequent involvement in extra-preschool speech training sessions.

Participation in small groups. The teachers were conducting a great many individual and small-group sessions with the children, and spending much of their time making plans for these sessions. Thus, it seemed to all of us that this part of the program would prove to be critical in enhancing the progress of the children. However, when the participation rates for each child were calculated, we were much less optimistic.

At the end of 1975-76, it was found that the low-income children had participated, on the average, in 14.9, and the high-income children in 12.8 small-group sessions. These were disappointing figures and the teachers were urged to increase them. However, in 1976-77, they had only limited success. On closer scrutiny the reason for this was found: there was not enough time for this kind of activity.

Small groups were offered during six months of the school year. Each teacher was scheduled for this type of teaching during two weeks of every four and had seven children to involve. In six months there were approximately 25 weeks, but holidays and special events (e.g., field trips), reduced this number to the equivalent of 22 weeks. Thus, each teacher had only 11 weeks to work with her special children. The participation rates indicate that each teacher had managed to involve each child at least once and sometimes twice in each of these weeks.

This was an important finding. Since the participation rate for any given child was only two to four times a month, it seemed probable that the direct impact of this kind of activity might be relatively modest.

Program Modifications: Summary

Perhaps the only significant change in the program, after the first project year, was in the teachers themselves. Their focus gradually shifted more and more to the cognitive goals of the program. They became more knowledgeable about cognitive development, and became increasingly sophisticated about how to stimulate children's representational processes. Even though they were unable to do a great deal of individual work with the children, they did enough to assess their developmental levels. This information was conveyed to the rest of the teaching staff and was used in other parts of the program.

As was pointed out in Chapters 3, 4 and 5, all parts of the program were planned to provide opportunities for cognitive growth, and as the teachers improved their understanding of the cognitive goals, they became more skilled at helping the children take advantage of these opportunities. Also, as they improved their teaching strategies in the small-group sessions, they transferred these skills into their informal interactions with the children during free play.

SPECIAL STUDIES

In the third and fourth project years, several special studies were conducted in the preschool which yielded valuable information about the program. The purpose of some of these was to measure the immediate effects on behavior of specific program variables, but the purpose of others was to test hypotheses which were less directly related to the program's behavioral goals. One of the latter was a partial test of the theory on which the program was based. Brief descriptions of these studies and their findings are provided in this section.

Situational Factors as Critical Variables

It was mentioned earlier that, at the end of the second project year, the findings from the summative evaluations suggested that the program had been less effective in Year 2 than in Year 1 in increasing the social abilities of the younger children who were in their first preschool year. At that time the peer interactions of 20 three-year-olds enrolled in Year 1 and 20 three-year-olds enrolled in Year 2 were compared. As indicated by an analysis of variance of the data, both groups increased their peer interaction scores significantly ($p < 0.1$) from fall to spring, but the increase was greater ($p < .05$) in the Year 1 than in the Year 2 group. This was further confirmed by a post-hoc t-test comparison of the mean gain scores of the two groups, which was significant at the $p < .01$ level (Wright & Pederson, Note 1).

These results suggested that the changes made in the program for the second year had, as was suggested by impressionistic data, increased the amount of private task-oriented behavior and that this, in turn, had reduced the amount of time the children spent interacting with their peers and perhaps their interest in peer social interaction. In the third project year, an attempt was made to obtain more objective information on the amount of constructive behavior the "less complex" environment was producing, and whether this was reduced and peer social interactions were increased when novel dramatic play centers were introduced.

During the fall term in Year 3, the main indoor playroom was set up and developed in the same way as it had been in Year 2 except that no dramatic play centers were introduced. During November and December the play behavior of the children was assessed. The assessment was conducted by D. R. Pederson and his students (Wright & Pederson, Note 1). All 56 children in the preschool were employed as subjects. Two sets of criteria were used for classifying their behavior: one developed by Parten (1932) and the other by Smilansky (1968). These categories were combined in the manner proposed by Rubin, Maioni and Hornung (1976). Two additional categories of behavior were also scored. These were teacher-child play (teacher actively involved in the child's play) and teacher-child non-play (teacher reading to child or child talking to teacher).

Each child was observed during indoor free play for one minute on each of ten consecutive days. The order in which the children were observed was randomized daily. There were two behavior coders. Interobserver reliability checks were made prior to data collection. The agreement between the coders over eight sessions ranged from 81% to 92% with an average agreement of 85%. The scores obtained were time scores.

It was found, using Smilansky's criteria, that 67% of the play behavior observed was constructive and only 23.7% was dramatic. Using Parten's categories plus the two additional (teacher-child) categories, it was found that for 77% of the time during which the children were observed, they were engaged in solitary or parallel play or were doing something with a teacher and that they were in group play only 23% of the time. These findings confirmed that the "less complex" environment, which included no novel dramatic play centers, was more effective in producing private task-oriented play than in inducing social play. As compared with two other programs for which comparable data were available, this environment was producing more constructive and less dramatic play than one (Rubin et al., 1976) but about the same amount of social play as the other (Barnes, 1971).

In January two new play centers were introduced which were expected to increase the amount of social play and perhaps decrease the amount of constructive play. One was a novel socio-dramatic play center which had been very popular with the children in Year 2 (a *unisex* hairdressing salon). The other was a richly equipped large-block center which occupied the whole area available in the smaller playroom. The block center was available throughout the whole winter term, but other centers replaced the hairdressing salon, with a new one being developed each month.

The play behavior of the children was re-assessed during the winter term using the same methods employed in the fall. The results confirmed the expectation that the new environment might reduce the amount of constructive play (Smilansky's category). The mean score for constructive play was significantly lower ($p < .01$) in the winter, than in the fall term. However, the increases in social play (associative and socio-dramatic play) were not as large as were expected. There were consistent trends in the expected direction, but the differences between the fall and winter scores were not large enough to be significant.

Because, as was stated earlier, socio-economic differences in the play behavior of young children have been frequently reported, the data obtained in this study were re-analyzed by income group. No significant differences were found.

Use of Dramatic Play Centers

This study was done in the fourth project year and had a number of purposes. One was to determine whether the location of the play centers in the main playroom (described in Chapter 2) did, in fact, tend to direct the children into more private activities during the first part of the daily sessions and delay their entry into the more active (social) play areas which were located on the opposite side of the room from their point of entry. Other purposes were to determine which children used the dramatic play centers most: the boys or the girls, the older or the younger, the high- or low-income children, and how this was affected by the familiarity or novelty of the center.

The spontaneous play of the children in dramatic play centers, in the main playroom, was videotaped for 15 minutes of every school day over a period of eight weeks. Two types of centers were observed: (a) the familiar housekeeping one and (b) novel centers (a medical center and a restaurant). The 15-minute time samples were taken at two different periods: Period 1 began 15 minutes after the program had started (9:15 a.m. or 1:15 p.m.); Period 2 began 45 minutes after the program had started (9:45 a.m. or 1:45 p.m.).

The eight-week observational period was divided into four 2-week blocks. In the first and fourth blocks, only the housekeeping center was available and it was observed half of the time during Period 1 and half of the time during Period 2. In the second and third blocks a novel center was introduced and this, as well as the housekeeping center, was observed. In Block 2 the novel center was a medical center and it was observed during Period 2 while the housekeeping center was observed during Period 1. In Block 3 a restaurant replaced the medical center and was observed during Period 1 while the housekeeping center was observed during Period 2. Thus, half of all of the observations were taken in Period 1 and the other half in Period 2.

During this eight-week period careful records of the involvement of the children in out-of-playroom activities were kept so that time-in-center scores for each one could be calculated as a proportion of the time-in-playroom spent in the centers.

The initial analyses of the data were done by K. G. Snively (Note 2). Additional analyses were done by M. Marschark. Marschark's findings confirmed that the dramatic play centers were used more in Period 2 than in Period 1, suggesting that the location of the centers did tend to delay the children's entry into them until the latter part of the first hour of each session.

Both data analyses showed that the girls used both the familiar and novel centers more than the boys, although the difference was greatest for the housekeeping center. This sex difference was difficult to interpret, because an attempt had been made to make the novel centers equally attractive to boys and girls.

The three- and four-year-olds did not differ significantly in the extent to which they played in the centers, but the younger children spent more time in the familiar housekeeping center than did the older ones, and the older children used the novel centers more than the younger ones.

No socio-economic differences were found in time spent in these centers. The 20 low-income children who were in the program in the year in which the study was done were all four-year-olds, but eight were in their first and 12 in their second preschool year. These low-income children actually spent significantly ($p < .05$) more time in both the housekeeping and novel centers than did the high-income four-year-olds, the majority of whom were in their second preschool year. This was an important finding in view of the extensive literature which suggests that the ability to engage in dramatic play is positively related to socio-economic status. It was, however, consistent with the findings of Pederson reported above. It might be argued that the measures used in this study and those used by Pederson were not sophisticated enough to reveal socio-economic differences, but in other studies in which the Parten and Smilansky behavior categories have been used, such socio-economic differences have been found (Rubin et al., 1976). These findings suggested, therefore, that the encouragement offered by the UWO program to engage in dramatic play may have had the desired effect on the low-income children (i.e., had not only produced in them a "normal" degree of interest in dramatic play, but had facilitated their ability to engage successfully in dramatic play activities).

Dramatic Play Training Effects

Teacher-guided groups were used in the program to help children acquire new abilities and an interest in using these abilities during their free play. The abilities encouraged in this way included dramatic ones. For example, a story such as "The Three Billy Goats Gruff" would be enacted with the help of a teacher during group time. Then a center would be set up in the playroom which contained a book (with the same story) and a few appropriate props, in which the story could be enacted during free play. Other procedures were also used in the teacher-guided groups to stimulate interest in playing in the novel dramatic play centers. These included special projects in which props were made for the centers. Some information about the effectiveness of these strategies was obtained from a study conducted by Nina Howe (Note 3).

The purpose of Howe's study was to assess the effects of dramatic play training on the social abilities of the children, but an analysis was also made of the effects of the training on the amount of time the children spent in dramatic play during free play.

The subjects were 34 three- and four-year-olds. They were assigned to three treatment groups which were equated as closely as possible for sex, age, socio-economic status and social behavior score. Each of the groups was then randomly assigned to a dramatic play condition, a task-oriented condition or a control condition. The children in the dramatic play condition were given dramatic play training in small-group teacher-guided sessions. Those in the task-oriented condition planned and constructed props for dramatic play centers in small-group teacher-guided sessions. Those in the control group were given no treatment.

The subjects in the treatment conditions were scheduled to receive eight treatments, in sessions lasting 15 to 20 minutes, administered on alternate days during a four-week period. However, due to absenteeism, four of those subjects in the dramatic play condition and one of those in the task-oriented condition received only seven treatments. All treatment sessions were conducted by the same experimenter in a small room adjacent to the preschool. The sessions were videotaped to monitor the behavior of the experimenter.

Pre-test and post-test measures of the social behavior of the children, and of the amount of time spent in dramatic play centers during free play, were obtained. The procedures used for measuring social behavior are described in Chapter 7 but the criteria for judging social competence which were derived from the research reported in Chapter 7 had not at that time been established. The amount of time children spent in the dramatic play centers during free play was obtained using the same methods employed in Snively's study described earlier.

The results suggested that the dramatic play sessions had not had a significant impact on the social abilities of the children. When the pre- to post-treatment changes in the frequency with which the children initiated positive and successful peer interactions were examined, stronger and more consistent trends toward higher post-treatment scores were found for the dramatic play group than for either the task-oriented or control group, but the differences in the gains made by the three groups were not large enough to be significant. The impact of the dramatic play sessions on the amount of time the children voluntarily spent in the dramatic play centers during free play was, however, significant. Mean time-in-centers scores for the dramatic play group, the task-oriented group and the control group, respectively, were at pre-test 2.35, 3.02 and 7.5, and at post test 23.7, 5.4 and 5.4. The dramatic play treatments increased the children's time-in-dramatic play centers scores during the treatment period and this was sustained after the treatments were over. At the pre-treatment assessment time only three of the 10 children in this group spent any time in the centers, but at the post-treatment time all of them spent a substantial amount of time in the centers. It is noteworthy here that the task-oriented treatments had no sustained effect on the children's interest in playing in the dramatic play centers.

Effects of the Program on Cognitive Styles

The changes made in the program in the second year were aimed, in part, at reducing impulsivity and inducing more reflective cognitive styles. A study conducted by Jacqueline Tetroe (Note 4) provided some information about how successful the program was, as compared with a program in a day care center, in inducing more reflective behavior as measured by the Kansas Reflection-Impulsivity Scale for Preschoolers (KRISP).

The purpose of Tetroe's study was to assess the relative effectiveness of two types of training strategies for inducing more reflective cognitive styles. The study was not undertaken to assess the effects of any on-going process in the program, so will not be described. However, the subjects employed in one experiment included 20 from the preschool and 10 from a day care center. Therefore, the KRISP scores of these two groups were compared.

The preschool subjects were approximately one year younger than the day care subjects and age has been found to be a significant determiner of performance on the KRISP. In spite of the difference in their age at the pre-test time, the preschool children displayed longer latencies than the older day care subjects and were just as accurate. The immediate gains made by the day care subjects, when trained, were greater than those of the younger preschoolers, but one month later when they were re-tested there were no significant differences between the preschoolers and day care children. These findings could not be interpreted in terms of socio-economic differences because the proportion of children from low-income families was about the same in each group (35% in the preschool and 40% in the day care group).

Age and error scores were highly correlated in the day care group at both the pre-test ($r = -.912$) and post-test ($r = -.786$) times, suggesting that their performance was reflecting their developmental level. However, age and error scores were not correlated in the preschool group suggesting that variables other than developmental ones were affecting their performance. It seemed highly likely that these variables were the methods used in the preschool to induce more reflective cognitive styles.

The Development of Symbolic Play

The last study to be described is one which was a partial test of the hypothesis on which the program was based; namely, that preschool-age children are at a critical stage in their cognitive development when they are making the transition from a level at which they can deal with only concrete objects to one in which they can deal with representations or symbols of objects.

The study was conducted by Joy Elder (Elder & Pederson, 1978). It investigated developmental differences in children's symbolic use of objects at three age levels (2½, 3 and 3½ years of age). The children's ability to "pretend," or act out a pretend sequence (e.g., comb hair), under three different conditions was measured. The conditions were (a) when a similar substitute object was present (e.g., a flat piece of wood which could be used by the child as a substitute for a comb), (b) when a dissimilar substitute object was present (e.g., a car which could be used as a substitute for a comb) and (c) when no object was present. The results supported the hypothesis that there were developmental differences in the children's dependence on the availability of a substitute object, and in the importance of the similarity between the object and the real object it was to represent in the pretend sequence. The 3½-year-olds were able to pretend equally well under all three conditions, but the 2½-year-olds could respond appropriately under only the first condition (i.e., when the substitute object was similar to its referent). For them the physical properties of the objects appeared to determine what could be done with them, for when given a dissimilar object and asked to pretend it was something else, they frequently responded by using the object according to its own appropriate use. For example, when presented with a car and asked to pretend it was a shovel, many of them drove the car back and forth across the table. The three-year-olds appeared to be at a transitional level between that of the younger and the older children studied, and were on some, but not all items, successful in both the dissimilar and no-object conditions.

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Appendix A

PARENT REPORT FORM

Child's Name ____________________
Date ____________________
Completed by ____________________

Child's general reaction to the preschool

Has your child enjoyed coming to school a lot or a little? __________

What has he or she seemed to like most about it? ____________________

If your child has ever been unhappy about the preschool, what do you think was the cause of this?

In what ways do you think your child may have been affected by his/her preschool experience?

(This is not an easy question to answer because your child has been maturing with age and has been having many important experiences besides those in the preschool. However, your opinions about this will be appreciated. Please comment as little or as much as you like. Use reverse side of page if more space is required.)

1. Interaction with you: Is your child easier or harder to manage?

2. Self-control: Has your child increased his/her ability to manage himself/herself (accept the limits and behave responsibly)?

3. Interactions with other children: Is your child *more* or *less*
   (a) interested and friendly with playmates ____________________
   (b) cooperative (able to lead, follow and share) ____________________
   (c) competitive (struggles against another to obtain what he/she wants) ____________________

(d) other comments ____

____

____

____

4. Independence: Is he/she *more* or *less*

(a) able and willing to look after his/her physical needs (dressing, toilet)

____

(b) self-directed (able to make his/her *own* plans for occupying free time)

____

(c) self-confident when faced with a new or challenging problem or situation

____

(d) other comments ____

____

5. Interest in learning about and thinking about the world

(a) Interests: have your child's interests changed, or has he/she developed new interests which are pursued at home (e.g., in books, animal life, cooking, art work, numbers, letters, music, carpentry, etc.)? If so, please describe.

____

____

(b) Curiosity: does your child ask more questions or does he/she actively explore new objects and situations more than before?

____

____

(c) Creativity: is your child more resourceful or innovative than before (i.e., does he/she more frequently think up novel ways of doing or saying things)?

____

____

(d) Imagination: is your child more interested in "make believe," "pretending," acting out the role of another (dramatizing), making up a story, than before?

____

____

(e) Language Ability: has your child improved in his/her ability to express self fluently, freely and effectively (i.e., to tell you clearly what is on his/her mind)?

____

____

(f) Attention span: has the average length of time your child usually concentrates on any given activity increased?

____

____

(g) Reflective: has your child's tendency to "think things through" or "use his/her head" before taking action increased?

____

____

(h) Knowledge: what kind of knowledge or new information do you think your child has acquired in the preschool (e.g., ideas about colors, shapes, sizes, weights, quantities, ordering, classifying, spatial relationships, social roles, animal life, cause and effect relationships, etc.)?

____

____

Additional comments about your child's reactions to his/her preschool experiences or the effects you think these may have had on him/her.

General suggestions: Comments and suggestions about how the preschool might be improved, or about any matter that is of concern to you as parents.

7

Development of a Measure of Social Competence

This chapter describes a basic research project that we undertook to develop a measure of social competence for use in our main project.[1] Efforts to evaluate the effects of early education on the social development of young children have been seriously handicapped by the lack of such a measure (Zigler & Trickett, 1978). We wanted the measure to be an objective one, based on observations of the actual behavior of the children as they interacted with others in social situations, but little was known about the specific types of behavior that discriminated the more from the less socially competent child. Our purpose, therefore, was to develop a set of objective criteria for assessing the social competence of three- to four-year-olds in a preschool setting.

THEORETICAL CONSIDERATIONS

In reviewing the available literature we found that "social competence is a hypothetical construct which has no universally accepted meaning" (O'Malley, 1977). It is a complex notion which involves cognitive as well as emotional and motivational variables and some investigators

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[1] Much of the information presented in this chapter was first published in the *Canadian Journal of Behavioral Sciences* (Wright, 1980). Copyright (1980), Canadian Psychological Association. Used with permission.

(Anderson & Messick, 1974) have concluded that to measure it psychometrically a battery of tests must be used (Circus, 1975). Kohn and Rosman (1972) tried to define social competence from a personality trait or interpersonal relations point of view and used teacher ratings of children's coping styles in social conflict situations to measure it. A few investigators have attempted to define social competence in behavioral terms and to measure it objectively by observation in natural settings (White & Watts, 1973; Lieberman, 1977) but these have used widely different criteria for judging social ability. They have also used both positive and negative indicators of social skill and have combined the scores obtained in highly complex and arbitrary ways.

The goal of our research was to identify a set of positive indicators of social adaptive ability in the behavior of the children in the preschool and to develop a measure of social competence based on the frequency with which these positive indicators occurred. In thinking about what these indicators might be, we began by conceptualizing social competence as social adaptive ability and we tentatively defined it as initiated social interaction which is positive in quality and effective in achieving social goals. There was some evidence that social competence is reflected more in the quality than the frequency of children's social interactions (Jennings, 1975) and Leiter (1977) found that the quality of an initiation affected its outcome (i.e., that friendly initiations produced more "agree" responses than did other initiations). However, the effectiveness of children's attempts to influence others as an index of social competence appeared to have received little or no research attention. This seemed strange to us because R. W. White (1959) in his influential article on competence had conceptualized it as effectance motivation or the impulse to produce effects on the environment.

In studying social competence Bronson (1974) had shown that an interactional analysis was essential. Therefore, in our approach an interactional analysis of the children's social behavior was employed. The behavior of both the initiator of an interaction and the recipient of the initiation (the responder) was examined.

The literature on the social behavior of children in the preschool suggested that a preschooler's social competence was likely to be reflected more in his or her interactions with peers than with teachers. More able preschoolers tend to increase their contacts with peers and reduce their contacts with teachers over time in the preschool and popularity with peers is negatively associated with dependency on teachers (McCandless, Bilou, & Bennett, 1961; Stith & Connor, 1962; Hartup, 1963; Raph, Thomas, Chess & Korn, 1968). However, this issue was by no means settled. Hence in our study we observed both child-adult and child-child interactions.

METHOD

We conducted the social competence research project over a five-year period in the UWO Preschool using as subjects children in both the morning and the afternoon programs. There were approximately 27 children in each class. One quarter to one third of them were from low-income families. The others were from middle- to upper-income families. We studied all of the available low-income children and a similar number of high-income children of the same sex and age.

The work proceeded through four stages. In the first, the data accumulated in the first four years of the project were subjected to a simple frequency analysis to determine which of the social interaction events selected for study occurred often enough to differentiate the subjects. In the second stage, the major validity and reliability study was done. In this stage a set of social interaction events was identified which differentiated the most from the least competent children in the preschool, and a composite measure based on these findings was developed. In the third stage, the social cognitive correlates of the new composite measure were explored and the work was done so that it would provide a partial replication of that done in Stage 2. In the fourth stage, the effects of age, sex, socio-economic status and preschool experience on the new composite measure were examined.

Stage 1—Frequency Analysis

Subjects

Seventy[1] subjects were observed as three-year-olds during their first year in preschool or a day nursery: 34 low SES (15 boys, 19 girls) and 36 high SES (18 boys, 18 girls). Fifty of these subjects were observed again as four-year-olds in their second preschool year: 24 low SES (11 boys, 13 girls) and 26 high SES (12 boys, 14 girls). The 20[1] subjects not studied as four-year-olds were not re-enrolled in preschool (or the day nursery) for a second year. The 50-subject sample represented three subject cohorts who attended our preschool in the first and second, the second and third, and the third and fourth years of the project, respectively.

Social Interactions Scored

An event sampling procedure was employed. The interaction events scored were the ones included in ten categories of behavior as defined in the checklist for assessing the social abilities of one- to six-year-old children, developed by B. L. White and his associates (White & Watts, 1973). Five were child-child or peer (P) interaction categories (Seeking the Attention of P, Using P as an Instrumental Resource, Leading/ Following P, Expressing Affection/Hostility to P, Competing with P), and five were child-adult (A) interaction categories (Seeking Attention of A, Using A as a Resource, Expressing Affection/Hostility to A, Playing an Adult Role, Expressing Pride). Initiated interactions which were social influence attempts (e.g., Leading P) were assessed on two dimensions (quality and effectiveness) and were classified into four types (positive/ successful, positive/unsuccessful, negative/successful or negative/ unsuccessful). Competitive behavior was classified on the effectiveness (successful/unsuccessful) but not the quality dimension. Respondent behavior was classified as "follows" (agrees, imitates) and "fails-to-follow" (resists influence attempts). In all, 26 types of interactions were scored. Some of the coding rules and behavioral definitions that we used differed from those employed by White's group. These are described in Appendix A in *A Supplement to the Manual for Assessing Social Abilities.* We also developed our own *Social Behavior Checklist* (see Appendix B).

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[1] Ten of the subjects were low-income children in day nurseries.

Observation Procedures

The subjects were assessed twice each year, once in the fall, six to eight weeks after they were enrolled and were familiar with the preschool, and seven months later in the spring. Each subject was observed for five 10-minute periods, for a total of 50 minutes. The observation was continuous during each period. Continuous observation over these relatively long time periods was required to assess the outcome variable (i.e., how the recipient of a social influence attempt responded). One of the five samples for each child was taken on each of five different but consecutive school days, and each of the samples was taken at a different specified time in the program (in the morning at 9:15 and 9:45 during indoor free play, at 10:15 during a teacher-guided group activity, and at 10:45 and 11:15 during outdoor free play). In the afternoon class the samples were taken at equivalent times.

There were four observers, two men and two women. At least three of the observers coded one (or two) of the 10-minute samples for each child. The observations were made in the playroom or playground so that the conversations of the subjects could be clearly heard, but prior to data collection care was taken to make the observers familiar and uninteresting to the children until their presence was ignored. The observers worked without knowledge of the socio-economic status of the subjects or of any of the other evaluation data obtained on them.

Inter-Observer Reliability

Each observer was compared with each of the other three observers for agreement on the simultaneous coding of five 10-minute samples of the behavior of ten different children who were not subjects in the main project, both before and during (with samples taken at irregular intervals) each assessment period. The formula for calculating the indices of reliability was:

$$\frac{\text{Number of Agreements}}{\text{Number of Agreements} + \text{Number of Disagreements}} \times 100$$

The counts of agreements and disagreements were based only on those situations (event boxes) in which at least one judge observed the behavior to occur. Event boxes in which no scoring occurred were not included to avoid artificially inflating the size of the coefficients. The overall agreement among all coder pairs ranged from 87.1% to 89.6%.

Results

Child-child interactions occurred more frequently than child-adult interactions at both the three- and four-year-old levels. The mean child-child interaction frequencies (per 50 minutes) for the three-year-olds were 55.4 (*SD* 24.3) in the fall and 76.2 (*SD* 31.9) in the spring. For the four-year-olds they were 76.7 (*SD* 25.2) in the fall and 97.6 (*SD* 34.2) in the spring. In contrast, the mean child-adult interaction frequencies were, for the three-year-olds, 11.3 (*SD* 9.4) in the fall and 9.4 (*SD* 6.3) in the spring, and, for the four-year-olds, 9.8 (*SD* 8.6) in the fall and 10.0 (*SD* 7.3) in the spring. The increase in the child-child interaction rate from fall to spring was significant at both the three- and four-year-old levels (t ratios = 4.34, $p < .001$ and 3.49, $p < .001$ respectively) but the child-adult interaction rate did not change significantly over time.

Of the 26 types of interactions scored, only 17 (12 child-child and 5 child-adult) occurred frequently enough to yield scores which differentiated the subjects. These 17 events are listed in Table 1 with their mean frequencies (per 50 minutes) for each age group at each testing time. We concluded from these results that only the 17 most frequently occurring interaction events should be subjected to further study.

Stage 2—Development of Criterion Measures

The aim at this stage was to select from among the 17 frequently occurring interaction events those which were the most highly correlated with other tests and measures of adaptive ability in the

Table 1

Mean Frequencies Per 50 Minutes for 17 Types of Interaction Events at Two Age Levels by Assessment Time

	Three Year Olds (n = 70)				Four Year Olds (n = 50)			
	Fall		Spring		Fall		Spring	
Interaction Event	*Mean*	*(SD)*	*Mean*	*(SD)*	*Mean*	*(SD)*	*Mean*	*(SD)*
Child-Child								
Seeking Attention								
Positive/Successful	7.89	(5.50)	13.04	(8.07)	12.54	(7.64)	18.56	(10.37)
Positive/Unsuccessful	4.23	(3.48)	5.79	(4.78)	5.08	(3.94)	6.42	(4.28)
Using as a Resource[a]								
Positive/Successful	2.64	(3.08)	4.46	(4.21)	5.52	(4.68)	10.48	(8.56)
Positive/Unsuccessful	1.20	(1.38)	1.97	(2.42)	1.94	(2.47)	3.84	(3.24)
Leading								
Positive/Successful	4.81	(5.01)	6.21	(5.38)	7.56	(4.83)	10.08	(7.58)
Positive/Unsuccessful	3.19	(3.59)	3.43	(3.28)	2.90	(2.41)	3.84	(2.59)
Expressing Affection	4.68	(4.46)	8.26	(5.12)	7.82	(6.57)	11.92	(6.80)
Expressing Hostility	1.09	(2.01)	1.18	(2.49)	0.92	(1.48)	1.22	(1.98)
Competing								
Successful	3.89	(3.40)	5.33	(4.32)	7.70	(5.92)	7.36	(5.21)
Unsuccessful	3.14	(3.40)	3.41	(2.88)	4.22	(3.67)	4.68	(3.54)
Following	15.43	(6.51)	18.23	(7.36)	15.96	(5.42)	15.04	(6.52)
Failing to Follow	2.84	(2.66)	3.29	(2.74)	3.56	(2.44)	4.12	(2.74)
Child-Adult								
Seeking Attention								
Positive/Successful	4.30	(4.67)	3.83	(3.01)	3.48	(3.36)	3.72	(2.97)
Positive/Unsuccessful	2.09	(2.17)	1.61	(1.97)	1.26	(1.58)	1.20	(1.97)
Using as a Resource								
Successful	2.31	(2.80)	1.59	(1.98)	2.20	(2.94)	2.24	(2.36)
Unsuccessful	1.20	(1.95)	0.40	(0.94)	0.60	(1.07)	0.62	(1.23)
Expressing Affection	1.56	(1.72)	1.60	(1.68)	2.32	(3.20)	2.20	(2.16)

[a] Using as a Resource = Using as an Instrumental Resource

preschool, to develop a composite score based on the findings and to determine its reliability.

Subjects

The subjects were 57 children on whom complete assessment data had been obtained during at least one preschool year. Twenty-eight of the children were three-year-olds in their first preschool year (12 low SES [6 boys, 6 girls], 16 high SES [8 boys, 8 girls]) and 29 were four-year-olds in their second preschool year (12 low SES [5 boys, 7 girls], 17 high SES [8 boys, 9 girls]). Their mean age (fall) was 44.5 months (*SD* 6.7, range 34-57 months) and their mean SES index (Blishen, 1967) was 54.5 (*SD* 21.6, range 27.8-76.0).

Assessment Procedures

The social interaction assessment procedures were exactly the same as those employed in Stage 1, described above.

Tests and measures[1]. Seven tests were used. These were four of the Circus test battery (Circus, 1974), "Say and Tell" (Language), "How Much and How Many" (Number), "Think It Through" (Problem Solving) and "Make a Tree" (Creativity); the Preschool Inventory (1970 edition), the Stanford-Binet Intelligence Scale; and the Kansas Reflection-

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[1] A more detailed description of these tests and measures is provided in Chapter 8.

Impulsivity Scale for Preschoolers (KRISP, Wright, Note 1). Teacher ratings of six dimensions of learning styles and preschool adjustment (self-direction, mastery motivation, self-management, curiosity, creativity and imagination) were also obtained. Each dimension on the rating scales was operationalized in behavioral terms. The ratings were made on seven-point scales with the points defined in terms of how frequently the behavior was displayed. Four teachers rated each child, whose score was then the mean of the four ratings assigned.

Testing and rating procedure. All tests were administered individually during two 4-week assessment periods, one in the fall, the other in the spring. They were given on days when the child's social behavior was not observed and in a randomized order except that the Binet and Preschool Inventory were always given to each child in separate weeks. Only one test was given to a child on any day and each test was given to all subjects by the same tester. The subjects were tested in the same order in the spring as in the fall except when absenteeism made this impossible. The teacher ratings were also made during the four-week assessment periods. Each teacher rated one quarter of the subjects in each of the four weeks. Thus, each subject was rated every week but by a different teacher.

Results

Factor analyses. In order to reduce the number of variables, four separate factor analyses were conducted and factor scores obtained. These consisted of principal axis factor analyses rotated to the varimax solution of (a) the test and rating scale scores and (b) the social interaction event scores. Analyses were done on (a) the fall and (b) the spring data resulting in the four factor matrices.

The analysis of the test and rating scores, in both the fall and the spring, yielded only one Factor which was interpreted as a General Cognitive Competence (GCC) Factor. The results are shown in Table 2. A GCC Factor score was, therefore, computed for each child for both the fall and the spring as an index of General Cognitive Competence.

The analysis of the social interaction event scores (for the 17 events listed in Table 1) yielded two factors in both the fall and the spring. The first was a Child-Child Factor and the second a Child-Adult Factor. Ten of the 12 child-child events loaded on Factor I in the fall and nine did so in the spring. Four of the five child-adult events loaded on Factor II in the fall and all five did so in the spring. The results of these analyses are presented in Table 3. Child-Child and Child-Adult Factor scores were computed for each child for both the fall and the spring.

Relations among the Factor scores. The Child-Child Factor scores were significantly correlated with the GCC Factor scores in both the fall (.51, $p < .01$) and the spring (.33, $p < .01$), suggesting that

Table 2

Results of the Principal Axis Factor Analysis of the Test and Teacher Rating Scores at Each Assessment Time

	Fall	*Spring*
Circus tests:		
"Say & Tell" (Functional Language)	.768*	.759*
"How Much & How Many"	.853*	.862*
"Think It Through"	.806*	.899*
"Make A Tree"—Appropriate	.586*	.617*
—Unusual	.625*	.635*
Preschool Inventory	.924*	.925*
Binet IQ	.558*	.735*
KRISP Errors	-.269	-.731*
Teacher Ratings:		
Self-Direction	.797*	.631*
Mastery	.906*	.845*
Self-Management	.916*	.819*
Curiosity	.743*	.572*
Creativity	.910*	.895*
Imagination	.709*	.465*

Note:
Factor loadings of .325 (i.e. the value of a significant correlation coefficient, $p < .01$, df = 57) or higher were considered meaningful.
*$p < .01$

these scores were differentiating the most from the least competent children. Also, the fall and spring Child-Child Factor scores were correlated (.52, $p < .01$) suggesting a fairly high degree of reliability for this measure. However, the Child-Adult Factor scores were not correlated with the GCC Factor scores in either the fall (-.01) or the spring (-.23). Furthermore, the fall Child-Adult Factor scores did not correlate with the spring ones (.15) suggesting that these scores were not stable over time.

These findings, which indicated that the Child-Adult Factor scores were not reliable and that they were not relating to other measures of adaptive ability, led us to the conclusion that little would be gained by subjecting the child-adult data to further study. Hence, they were abandoned. However, because the Child-Child Factor scores appeared to be fairly reliable and to be relating to the other indices of competence, we concluded that further analyses of the child-child data might prove fruitful and should be pursued.

Table 3

Results of the Principal Axis Factor Analyses of the Social Interaction Event Scores at Each Assessment Time

Interaction Event	*Fall* *Factor I*	*Fall* *Factor II*	*Spring* *Factor I*	*Spring* *Factor II*
Child-Child				
Seeking Attention				
Positive/Successful	.875*	.019	.703*	-.156
Positive/Unsuccessful	.718*	-.347*	.501*	-.098
Using as a Resource[a]				
Positive/Successful	.568*	.070	.714*	.019
Positive/Unsuccessful	.624*	-.313	.614*	.022
Leading				
Positive/Successful	.588*	.004	.792*	-.045
Positive/Unsuccessful	.626*	-.250	.775*	.092
Expressing Affection	.317	.100	.534*	-.281
Expressing Hostility	.432*	-.005	.365*	.120
Competing				
Successful	.384*	.220	.150	.690*
Unsuccessful	.363*	.136	.291	.542*
Following	.125	-.182	.043	-.041
Failing to Follow	.341*	-.441*	.611*	.017
Child-Adult				
Seeking Attention				
Positive/Successful	.047	.726*	-.167	.636*
Positive/Unsuccessful	-.155	.293	.170	.423*
Using as a Resource				
Successful	.307	.724*	-.081	.593*
Unsuccessful	.134	.395*	-.171	.477*
Expressing Affection	.025	.548*	-.099	.428*

Note:
Factor loadings of .325 (i.e., the value of a significant correlation coefficient, $p < .01$, df = 57) or higher were considered meaningful.

[a] Using as a Resource = Using as an Instrumental Resource

*$p < .01$

Relations between the GCC Factor and each type of child-child interaction. In order to identify the child-child interaction events which were contributing most to the positive relationship between the Child-Child Factor and the GCC Factor scores, correlations between each of the 12 child-child event scores and the GCC Factor score were calculated for both the fall and spring.

It was found that three types of interactions were significantly related to GCC at both assessment times. These were "Seeking the Attention of Peers—Positive/Successful," "Using Peers as an Instrumental Resource—Positive/Successful" and "Leading Peers—Positive/Successful." These results are presented in Table 4. Note that in the fall

Table 4

Correlations Between the Child-Child Social Interaction Event Scores and the General Cognitive Competence Factor Scores at Each Assessment Time

Interaction Event	*Fall*	*Spring*
Child-Child		
Seeking Attention		
Positive/Successful	.44**	.32**
Positive/Unsuccessful	.26*	.09
Using as a Resource[a]		
Positive/Successful	.44**	.34**
Positive/Unsuccessful	.26*	.14
Leading		
Positive/Successful	.62**	.37**
Positive/Unsuccessful	.32**	.10
Expressing Affection	–.03	.42**
Expressing Hostility	.22	.03
Competing		
Successful	.42**	–.02
Unsuccessful	.13	.04
Following	–.20	–.12
Failing to Follow	.21	.20

[a] Using as a Resource = Using as an Instrumental Resource

*$p < .05$

**$p < .01$

positive/*unsuccessful* events of these types were also related to GCC, but by the spring only the positive/*successful* ones were so related. Thus, especially for children with preschool experience, the ability to obtain a desired response from a peer appeared to be a more powerful indicator of competence than the quality of the attempt to do so. However, the friendly quality of the initiation may have been a necessary condition (even though it was not a sufficient condition) for producing a successful response.

The face validity of these three types of interactions as indicators of superior social competence was high. Also, they all appeared to be measuring similar abilities of a social kind, as was indicated by their positive loadings on the Child-Child Factor. It seemed likely, therefore, that individual differences in the frequency with which children displayed these three types of interactions in the preschool were reflecting differences in social competence.

The Peer Interaction, Quality-Effectiveness Score (PI,Q-ES). Event scores for positive/successful instances of leading peers, seeking their attention and using them as an instrumental resource were, therefore, combined by simple addition to obtain a composite score which will be referred to as the Peer Interaction, Quality-Effectiveness Score (PI,Q-ES).

The PI,Q-ES was significantly correlated with the GCC Factor score in both the fall (.61, $p < .01$) and the spring (.42, $p < .01$). Also, the fall and the spring PI,Q-ESs were correlated (.53, $p < .01$). Thus the PI,Q-ES was just as successful in differentiating the most from the least cognitively competent children in the preschool, and was just as stable over time, as the Child-Child Factor score, even though it included scores for only three of the types of child-child interaction events assessed.

To determine whether the five 10-minute behavior samples had provided enough observation time to yield stable PI,Q-ESs for individual subjects, a Cronbach Alpha Reliability Coefficient was computed on the spring data. The coefficient obtained was .73. This was considered to be relatively high in view of the varying conditions under which the samples had been taken (on different days, at different specified times on each day, in free play indoors and outdoors, and in a teacher-guided activity). Since these different conditions provided unequal opportunities for expressing the target behaviors, an effort was made to assess situation effects.

The teacher-guided activity provided the least opportunity to interact with peers so the sample taken in this setting was eliminated and a reliability coefficient was computed on the four samples taken during free play. The coefficient obtained was .77 suggesting that the expected situation effect may, in fact, have been operating. The social behavior of the subjects across outdoor and indoor free play situations was, however, fairly consistent. The correlation between the PI,Q-ESs obtained in these two settings was .62, $p < .01$.

Stage 3—Social Cognition and the PI,Q-ES

Piaget (1967) has suggested that the development of social competence is dependent on social cognition or the ability to covertly, by cognitive action, take on the role of another and assume his or her perspective. However, the assumption that social competence is dependent on social cognition has received little research attention. Furthermore, little is known about how children's abilities to understand the thoughts and feelings of others are related to their social behavior (Shantz, 1975). Since the results reported above indicated that social competence as measured by the PI,Q-ES was related to cognitive competence, it seemed likely that it might also be related to social cognition. This possibility was, therefore, explored. The work in this stage was conducted so that it would also constitute at least a partial replication of that done in Stage 2.

Subjects

The subjects were 48 four- to five-year-olds (mean age 58.4, *SD* 3.8, range 49 to 65 months). Half were of low SES (12 boys, 12 girls) and the other half high SES (12 boys, 12 girls). Twenty-one of them were children who were used as subjects in Stage 2 when they were three-year-olds (12 low SES: 6 boys, 6 girls; 9 high SES: 4 boys, 5 girls), but the other 27 were new subjects. Twenty-six of the subjects were in their second and 22 in their first preschool year.

Assessment Procedures

Complete data on all of these subjects were collected only once during the school year (i.e., at the spring assessment time). The social behavior assessment procedures used were exactly the same as those already described, except that only two rather than four observers gathered data on half of the sample. The overall inter-observer reliabilities achieved were high, ranging from 88.3% to 93.4%. All of the tests and measures used in Stage 2, with the exception of two Circus tests ("Say and Tell" and "Make a Tree"), were employed and the same procedures were used for administering the tests and obtaining the teacher ratings.

The battery of role-taking tests. Seven tests which were reported to be appropriate in difficulty for preschool children were employed. They were tests of the following:

1. Visual perspective-taking (Masangkay, McClusky, McIntyre, Sims-Knight, Vaughn & Flavell, 1974). The subject was asked to tell what the examiner was seeing on the examiner's side of each of two cards.
2. Visual perspective-taking (Kurdek & Rodgon, 1975). The subject was asked to rotate a revolving tray to show how objects (Walt Disney characters) on the examiner's similar tray were being seen by the examiner.
3. Tactile perspective-taking (Flavell, 1970). The subject's hand was pressed against a soft cotton-covered end of a pencil while the examiner's hand was pressed against the sharp end and the subject

was asked if the pencil felt soft in the examiner's hand.

4. Affective perspective-taking (an adaptation of Borke's test, 1971, proposed by Kurdek & Rodgon, 1975). The subject was asked to identify the affect of a like-sexed child in pictorially presented familiar situations. Half of the pictures portrayed a child expressing an appropriate affect and the other half an inappropriate affect. The inappropriate-affect pictures were included to force the children to judge the affect expressed rather than respond in terms of their knowledge of how one would be likely to feel in such situations (e.g., happy at a birthday party).
5. Affective perspective-taking (Urberg & Docherty, 1976). The subject was asked to describe and give reasons for the affect of self and other in three pictorially illustrated story sequences (e.g., when a friend won the game).
6. Cognitive perspective-taking (Flavell, 1970). The subject was asked to select appropriate gifts for parents, a teacher and a like-sexed friend.
7. Social knowledge. The subject was asked to respond to two items from the Wechsler Preschool and Primary Scale of Intelligence.

Each role-taking test was administered individually and given in a randomized order prior to the administration of one of the non-role-taking tests. Each subject was in only one testing session on any given day and was given only one role-taking test.

Results

Replication of Stage 2. The results were essentially the same as those obtained in Stage 2. The factor analysis of the test and teacher rating scores yielded only one Factor (a General Cognitive Competence Factor) and the analysis of the social interaction event frequency scores yielded two Factors (a Child-Child Factor and a Child-Adult Factor). Of the 12 types of child-child interactions observed, only the *successful* attempts to obtain attention and the *successful* attempts to use a peer as an instrumental resource were significantly related to the GCC Factor score (.35, $p < .01$ and .38, $p < .01$ respectively). The correlation between the PI,Q-ES and the GCC Factor score was .40, $p < .01$.

Role-taking and the PI,Q-ES. The PI,Q-ES was positively related to three measures: the fifth test (affective perspective-taking) .54, $p < .01$, the sixth test (cognitive perspective-taking) .30, $p < .05$; and one part of the fourth test (4a, the affect-appropriate part of this affective perspective-taking test) .24, $p < .06$. The PI,Q-ES did not relate to the third test (visual perspective-taking) or the seventh test, and the first and third tests were so easy for the subjects that most obtained perfect scores.

The three tests which related to the PI,Q-ES were all intercorrelated (#4a and #5 = .37; #4a and #6 = .35; #5 and #6 = .34; all $p < .01$) and each was also correlated with the GCC Factor score (.38, .56, .40 for tests #4a, #5 and #6 respectively, all $p < .01$). Thus, they all appeared to be measuring similar types of *social* cognitive abilities, but abilities which were also related to general cognitive competence.

Discussion

These findings suggested once again that the best single indicator of a child's social adaptive ability was his or her social influence effectiveness. They, therefore, reinforced the conclusion, arrived at in Stage 2, that the most economical way to assess a child's social competence was simply to measure (as in the PI,Q-ES) the frequency with which his or her social influence attempts were successful.

The fact that the PI,Q-ES related to measures of affective and cognitive perspective-taking provides some support for Piaget's view that social problem-solving depends on social cognition. However, the importance of this finding in the present study was that it provided additional support for the assumption that the PI,Q-ES was providing a valid measure of social competence.

Stage 4—Preschool Experience, Age, Sex and SES

An initial exploratory study of the effects of preschool experience (or age) on changes in the PI,Q-ES over time by Sex, SES and Cohort was done using the data on the 50-subject sample described in the Stage 1 report. These subjects represented three overlapping cohorts, each of which was in the project for two consecutive years—the first and second, the second and third and the third and fourth years respectively. A 2(Year in preschool:first, second) x 2(Time:fall,spring) x 2(Sex) x 2(SES) x 3(Cohort) ANOVA of the PI,Q-ES data yielded main effects for all variables except Cohort, and only one interaction effect. The scores were higher when the subjects were in their second than in their first preschool year (F [1, 38] = 55.7 $p < .0001$). Significant gains were made from fall to spring by all cohorts in both their first and second year, $F = 28.1$, $p < .0001$. However, these gains were greater when the children were in their second than in their first preschool year (Year x Time Interaction, $F = 5.67$, $p < .05$). The boys scored higher than the girls, $F = 12.67$, $p < .02$, and the high SES subjects scored higher than the low SES subjects, $F = 7.24$, $p < .02$, but these sex and SES differences did not account for the preschool (or age) effects.

Because of the confounding of preschool experience and age in the above analyses, an attempt was made to recruit a sample of four-year-olds without prior preschool experience that could be used as a comparison group to study the effects of one, as compared with two, years of preschool experience on the PI,Q-ES. Nineteen such subjects were obtained: 14 low SES (8 boys, 6 girls) and 5 high SES boys. The final PI,Q-ESs of these small samples were compared with those of the 24 low SES subjects (11 boys, 13 girls) and the 12 high SES boys (in the 50-subject sample discussed above), who had two years of preschool.

The mean PI,Q-ES of the high SES boys with two years in preschool was 52.2 (*SD* 4.6), significantly higher than that (25.4, *SD* 8.7) of the high SES boys with only one year in preschool (t [15] = 3.3, $p < .01$). This difference could not be accounted for by age. The mean ages of the groups were 58.8 (*SD* 3.1) and 56.0 (*SD* 4.6) months for the two- and one-year-in-preschool groups, respectively. The low SES boys and the low SES girls with two years in preschool did not, however, differ significantly from their counterparts with only one year in preschool, although the trends for both sex groups were in the direction of higher scores for those with the two years of preschool experience.

These findings indicated that young children increase their social competence in preschool and that when they are in their second preschool year as four-year-olds they are capable of making more rapid gains in social influence effectiveness than when they are in their first preschool year as three-year-olds. However, the results are inconclusive concerning the relative importance of preschool experience and age in the production of these gains.

SUMMARY AND CONCLUSIONS

The findings of our social competence research project provide information about some of the variables in the social interactions of preschoolers that are effective discriminators of differences in their social adaptive ability. They therefore suggest criterion measures which can be used for judging preschoolers' social competence. Furthermore, they provide information about some of the processes which appear to be involved in the development of social competence.

First, the results of the frequency analysis (Stage 1) support the view that a measure of a preschooler's social competence should be based on child-child rather than child-adult interactions. The greater frequency of the former than the latter suggests that for three- and four-year-olds in the preschool setting the social challenge derives from peers rather than teachers, and that social adaptive ability should be measured in terms of the extent to which this challenge is met and effectively handled.

The variable which most consistently distinguished the most from the least competent children (in both Stage 2 and Stage 3) was the successfulness of their attempts to influence the behavior of a peer. The PI,Q-ES was based on this finding and consequently was a measure of social-influence effectiveness. The frequency of their attempts to influence peers was also an important variable. This may have reflected their motivation to master the social environment and, perhaps, even their expectancy of success. The quality of their social influence attempts also appeared to be important. Being friendly or tactful may have been essential for producing acquiescence. However, a positive approach was no guarantee of a successful outcome. In summary, therefore, we found that social competence was reflected more in the effectiveness of social influence attempts than in their frequency or quality, and that the most satisfactory criterion for judging the social competence of children was the kind of response (acquiescent as opposed to resistant) they characteristically obtained from the recipients of their social influence attempts.

Finally, the correlates of the PI,Q-ES offer some suggestions about the processes on which the development of social influence effectiveness may depend. The PI,Q-ES was clearly related to cognitive competence (i.e., not just to intelligence, but to the motivation and ability to apply intelligence in a wide variety of different types of problem-solving situations including social ones). Social competence and cognitive competence may, therefore, be interdependent. However, if this is so, the correlational data available provide no information about whether social competence depends on cognitive competence or cognitive competence depends on social competence. It may be that the relationship between them can be accounted for by a third variable, perhaps effectance motivation, competence as it was conceptualized by R. W. White (1959). Our findings support such a conclusion because they suggest that social competence is simply one aspect of general competence and is reflected in autonomous striving to gain mastery over the social world and the ability to affect the behavior of others in socially acceptable ways.

ADDITIONAL INFORMATION ABOUT THE PI,Q-ES

Normative Data

In order to provide some standards against which the PI,Q-ESs of individual subjects could be compared, all of the scores of all of the subjects in the project on whom PI,Q-ESs had been obtained were

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Table 5

Extended Ordered Stem and Leaf Diagrams[1] of PI,Q-ESs[2] for Subjects at Four Age Levels

2 years, 8 months to 3 years, 3 months		*3 years, 4 months to 4 years*		*4 years, 1 month to 4 years, 9 months*		*4 years, 10 months to 5 years, 6 months*	
0	001111224	0	2234	0	34	0	
0	55566678889	0	5556666666888999	0	6666669	0	88
1	0011224	1	0001222333444	1	000222233344	1	4
1	5566689	1	55557777788889999	1	555667788999	1	6689
2	01123344	2	0011111222234444	2	0123444	2	124
2	5	2	55555666688889	2	6677788889999	2	79
3	1334	3	0000011223334	3	001111244444	3	223
3	67	3	6666777799	3	5566678888999	3	8899
4		4	0344	4	011233	4	011
4		4	6778	4	556	4	6799
5		5	2	5	134	5	4
5		5	8	5	678	5	67
6		6	0	6		6	
6		6	5	6	77	6	8
7		7		7		7	2
7		7	6	7	5	7	67
8		8		8		8	
8		8		8		8	7
n = 50 (18 boys, 32 girls) Mean (Boys) 19.3, *SD* 10.3 Mean (Girls) 11.3, *SD* 9.6		n = 115 (55 boys, 60 girls) Mean (Boys) 26.5, *SD* 14.2 Mean (Girls) 21.0, *SD* 13.8		n = 96 (47 boys, 49 girls) Mean (Boys) 29.3, *SD* 15.6 Mean (Girls) 27.3, *SD* 15.2		n = 34 (20 boys, 14 girls) Mean (Boys) 39.0, *SD* 20.3 Mean (Girls) 39.5, *SD* 21.5	

Notes:

[1] The extended ordered stem and leaf diagram was proposed by Tukey (1977). This is a means of presenting data in summary form, which has all of the illustrative advantages of grouped frequency distributions, but avoids losing any information contained in the original raw data (i.e., the score of each individual in the sample is represented). The stem identifies the first and the leaf the second digit in an individual's score. In the diagram for the youngest subject sample, in the first row where the stem is zero, the scores represented are 00, 00, 01, etc. In the seventh row where the stem is 3, the scores represented are 31, 33, 33, 34. (Tukey, J.W. *Exploratory data analysis.* Don Mills, Canada: Addison-Wesley, 1977.)

[2] Each score is based on 50 minutes of observation time (i.e., five ten-minute periods, one on each of five consecutive school days, two indoor and two in outdoor free play and one in a teacher-guided group activity). The observation was continuous during each ten-minute period.

distributed by age. The results are shown in four extended Stem and Leaf Diagrams, one for each of four age levels, in Table 5.

The PI,Q-ES and Other Scores Obtained from the Data

In addition to the Peer Interaction, Quality-Effectiveness scores (PI,Q-ESs), (i.e., the frequency with which the children initiated peer interactions which were positive [or neutral] social influence attempts with successful outcomes), it was possible to derive two other scores from our data. These were: (1) Peer Social Interaction Scores (PSISs), (i.e., the total frequency with which the children initiated the 12 types of peer-interaction events scored), and (2) Proportion Scores (i.e., the proportion of PI,Q-ES to PSIS scores).

It occurred to us that the Proportion Score might provide a more satisfactory measure of social competence than the PI,Q-ES because it might control for the general activity level of the children. We had found that at most assessment times the boys obtained higher PI,Q-ESs than the girls and realized that this might be due simply to the greater activity level of the boys. We, therefore, investigated the relations among the

PI,Q-ES, the PSIS and the Proportion (PI,Q-ES to PSIS) Score using correlational procedures. The data used for this purpose were those obtained with the 50 subjects who were in the program for two years. ANOVAs conducted on these data had yielded significant main effects for Sex on the PSIS (F [1, 44] = 7.80, $p < .01$), the PI, Q-ES (F [1, 44] = 9.57 $p < .01$) and the Proportion Scores (F [1, 44] = 11.49, $p < .01$).

Four sets of correlations (Pearson) among the three measures were calculated. The data used were those obtained at the first, second, third and fourth assessment times respectively. This showed that the PI,Q-ES was highly correlated with both the PSIS (.83, .89, .88, .90) and the Proportion Scores (.79, .79, .75, .78) at each (first to fourth) of the four assessment times. The PSIS and the Proportion Scores were also related, but at a much lower level (.41, .49, .37, .49).

A New Checklist and Manual for the PI,Q-ES

The above findings satisfied us that nothing would be gained by using Proportion Scores and that in future assessments of the social competence of our preschoolers we could safely reduce the burden on our observers to recording only those types of interactions which had discriminated the least from the most competent children and had therefore been included in the PI,Q-ES. It was clear that the PI,Q-ES was yielding a great deal of information about the children's social behavior because it provided a measure of both the frequency with which they initiated interactions with their peers and the proportion of those interactions which were effective social influence attempts.

If we were to record only PI,Q-ES type interactions we needed a new Checklist and a new Manual which would describe the observational and scoring procedures and provide behavioral definitions of the specific interaction events which were to be scored. These we proceeded to develop. The new Manual, which includes the new checklist, is presented in Appendix C. It is entitled the Peer Interaction, Quality-Effectiveness Score (PI,Q-ES) 1979 Revision.

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Appendix A

A SUPPLEMENT TO THE MANUAL FOR ASSESSING SOCIAL ABILITIES *

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PREFACE

The purpose of this supplement to the Manual published by White & Watts (1973) is to describe more precisely the scoring and coding rules applied in the UWO Preschool Project. We produced the supplement to clarify both the definitions of certain behavioral events and the rules for coding events by category.

The problem of coding by category was augmented by the fact that events could not be double scored. If events could be coded in two categories, certain categories were preferred and, although examples were given to illustrate when and how this was done, the principles on which the category priorities were based had to be inferred.

In the following, the first problem discussed is coding by category when events could be double scored. Other difficulties in interpreting the Manual are then dealt with in the order in which they occur.

Finally, difficulties in interpreting the instructions for calculating the weighted (social competence) scores are discussed.

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*Manual for Assessing Social Abilities of One- to Six-Year-Old Children prepared by Daniel Ogilvie and Bernice Shapiro, September 1969 and appended (April 1970) to B. L. White and J. C. Watts, *Experience and Environment* (Vol. 1), Prentice-Hall, Inc., Englewood Cliffs, NJ, 1973, pp. 332-351.

Problem 1

Coding by category when events could be double scored

Page 335— "Each scorable act then, should receive just one score. Multiple scoring of a single act should be avoided."

Comment

Although the authors have attempted to delineate category boundaries so that scoring confusions can be avoided, they have not, in all instances, made clear into which of two categories a score should be placed when a score in either category would be equally appropriate.

Example: S says to A who is talking to another child "Will you get me a pencil?"

This could be scored as Uses Adult as Resource because of the request for aid (p. 337). It could equally well be scored as Competes with Peer for Adult Attention because S is directing A's attention away from P (p. 349).

Throughout the Manual we found many instances in which the authors specifically point out which of two categories is to take precedence when this type of scoring confusion occurs.

Example: (p. 345) Leads in Peer Activities—Neg. "In order to avoid double scoring, actions that are intended to control the behavior of a peer in order to obtain a resource are scored under Part 3, Section II—Uses Peer as a Resource, rather than here; and strongly worded commands that indicate hostility are scored under Part B—Expresses Hostility to Adults."

However, we also found many instances where no specific directions were given and where it had to be assumed that one category was to take precedence over another.

Example: (p. 349) Competes with Peers for Adult's Attention. "Often S will compete for A's attention with one or more peers . . . S can begin a conversation with T who is paying attention to someone else and this is scored as competition."

Although starting a conversation was previously described as an attention-getting behavior to be scored under Attention of Adult (p. 335), we must now infer that where a behavior could be scored as either Attention of Adult or Competes with Peer for Adult Attention, the latter category takes precedence. We must also decide whether Competes with Peer for Adult Attention takes precedence over Uses Adult as a Resource, if S asks a question of T who is paying attention to someone else.

Scoring decisions

After examining all instances where illustrations were given, and analyzing all instances where there were no specific instructions, we drew up the following priority rules:

(a) Uses Adult (Peer) as Resource, Expresses Affection, Expresses Hostility, Leads in Peer Activities, take precedence over Attention of Adult (Peer).

Example: S suddenly hugs P and says, "Hi." This could be scored (a) Attention of Peer; (b) Expresses Affection. It will be scored as (b) Expresses Affection because this category takes precedence over Attention of Peer (p. 347).

Example: S and P are on teeter-totter and P starts to get off. S says, "Be careful. If you get off too fast, you'll fall." This could be scored (a) Attention of Peer; (b) Leads in Peer Activities. It will be scored as (b) Leads in Peer Activities because this category takes precedence over Attention of Peer (p. 345).

(b) Competes with Peers for Adult Attention takes precedence over Attention of Adult (Peer) and Uses Adult (Peer) as Resource (p. 349).

Example: S approaches T who is talking with another child and says, "Will you cut this for me?" This could be scored as (a) Competes with Peers for Adult Attention; (b) Uses Adult as Resource. It will be scored (a) Competes with Peers for Adult Attention because this category takes precedence over Uses Adult as Resource.

(c) Competes for Equipment is a category which takes precedence over a Leads/Follows sequence (p. 349).

Example: S is trying to wrestle a shovel away from P. Both children are shouting, "Give it to me" and neither child is following the direction of the other. This could be scored (a) Competes for Equipment; (b) a series of Leads and Follows or Fails to Follow. It will be scored (a) Competes for Equipment because this category takes precedence over a Leads/Follows sequence.

(d) Expresses Hostility takes precedence over Leads in Peer Activities—Neg. (p. 345).

Example: S screams at P, "Get out of here." This could be scored as (a) Leads in Peer Activities—Neg.; (b) Expresses Hostility. It will be scored as (b) Expresses Hostility because this category takes precedence over Leads in Peer Activities—Neg.

Problem 2

Perseveration of a response

Page 336— (Attention of Adult—Pos. 1c) "Any time a child calls the adult's name. . . he should receive a score."

Comment

On occasion, the act of calling a teacher or peer becomes perseverative (i.e., "Teacher, teacher, oh teacher, teacher."). This is done without any appreciable pause between calls.

Scoring decision

Where calling is perseverative, a score of one is given for the total extended attempt to get attention. When there are pauses (two seconds or more) between calls, each call is given a score of one.

Problem 3

Inferences about interactions

Page 337— (Attention of Adult—Neg. 2b) "This should be interpreted in the everyday sense of the word with the added feature of purposeful misbehaving in order to draw attention to oneself."

Comment

A child can misbehave for many reasons. While it is easy to observe the overt behavior of the child, it is far more difficult to infer the *purpose* of this behavior.

Scoring decision

Whenever there is a reasonable doubt as to the purpose of a behavior, score only that part of the behavior that can be observed objectively.

Example: Our subject spills the paint and then looks up at the teacher. We can infer but not be absolutely sure that our subject is trying to get the teacher's attention by misbehavior. Therefore, the behavior is not scored.

Example: Our subject runs up and pokes another child in the back. We can only infer that hostility has been expressed. What we actually observe is that our child successfully caught the attention of a peer. Therefore, only the observable behavior is scored (i.e., Attempt to Get Attention Peer—Successful). Where words or actions make hostility more observably evident, this behavior would then be scored as Hostility rather than Attention Getting (see Scoring decision, Problem 1).

Problem 4

Requests ending in a question mark

Page 337— (Uses Adult as a Resource - Instrumental, 3a)
"A request is any statement that can end in a question mark."

Comment

Children frequently develop the habit of tacking a question mark to the end of any statement they make.

Example: "I'm going over to the paint table, teacher, OK?"
Thus, a statement that might otherwise be scored as Attention Getting or Control is turned into a Resource by the simple addition of an inflectional ending.

Scoring decision

All questions are scored under Resource. Even an obvious lead such as "Give me that shovel" will be scored in the Resource category if an inflectional ending is tacked onto the end (i.e., "Give me that shovel, OK?").

The only time that a question is not scored as a Resource is when the Competes with Peers for Adult Attention category is involved (see Scoring decision, Problem 1-b).

Problem 5

Successful vs. unsuccessful resource seeking

Page 337— (Uses Adult as Resource—Instrumental)

Comment

Whenever a child asks a question, a decision has to be made as to whether this Resource Seeking behavior is successful or unsuccessful. When a child is simply seeking information, there is no problem. If the child receives the information he/she is successful. If the child does not, he/she is unsuccessful.

However, when the child is asking for help or for cooperation, a decision has to be made as to whether the success of the question depends on (a) an answer to that question (as with information), or (b) a compliance to the request.

Example: Our subject asks the teacher, "Will you help me glue this together?" The teacher responds, "No, I'm busy right now." Is this Resource behavior to be considered successful because the question was answered, or unsuccessful because the request was denied?

Scoring decision

A question that asks for *information* only is scored (a) successful if the information is given; (b) unsuccessful if the information is not given.

Example: S: "Do you like me?"
P: "No, I don't."

This is scored Successful Peer Resource because the subject received the information he or she was seeking.

A question that requires *action* as well as information is scored (a) successful if the requested action is performed; (b) unsuccessful if the requested action is not performed.

Example: S: "Will you tie my shoe for me?"
A: "No, I'm busy."

This is scored Unsuccessful Adult Resource because the request for aid was denied. It is *not* scored as successful on the grounds that the question was answered.

Problem 6

"On-the-spot" interpretation

Page 338— (Uses Adult as a Resource—Emotional, 4)
"After a hurt or disappointment, S seeks A's aid, support or affection. This should be distinguished from situations where S demonstrates affection to A and may require on-the-spot interpretation."

Comment

The meaning of the phrase "on-the-spot interpretation" is quite vague. It is to be assumed that White is telling the observer to subjectively evaluate those behaviors which could cause confusion in scoring.

Scoring decision

Whenever there is a reasonable doubt as to the interpretation of a behavior, score only that part of the behavior that can be observed objectively.

Example: Our subject has just fallen off a swing. He slowly walks over to a teacher and stands beside her. We can only infer that our subject is seeking the comfort of the teacher. Therefore, score only the observable behavior—moves toward and stands near adult, therefore, Attention of Adult - Pos.

Problem 7

Smiling

Page 341— (Expresses Affection, 8a[1])
"This category is reserved for instances in which S expresses focused pleasure to A in his presence."

Comment

When children are playing happily in the company of peers or adults, it is difficult to determine whether their continuing smiles are those of pleasure or of affection.

Definitional decision

A smile can be considered a sign of affection only if the child makes direct eye contact with another adult or child. All other instances where the child is smiling will not be scored as it cannot be assumed that affection is being shown, only that pleasure is being expressed.

Problem 8

Hostile verbal behavior

Page 342— (Expresses Hostility to Adults, 9a)

The Scoring Manual does not give a sufficient number of examples of hostile verbal behavior.

Comment

The only two examples given under the heading Expresses Hostility to Adults are "I hate you" and "You're bad." On page 339 under the heading of Controls Adults, two more examples of verbal hostility are given, "Shut up" and "Go to hell." White tells the observer to score these as Hostility rather than Leads or Commands (see Scoring decision, Problem 1-d).

It is difficult to objectively evaluate whether strongly worded commands "Get away from me" or expletives "Fuck off" are indicative of hostility or are merely attempts to get attention or attempts to direct adult or peer behavior.

Scoring decision

Where any strongly worded command could be scored equally well under Hostility or Neg. Lead, score the behavior under Hostility (see Scoring decision, Problem 1-d). However, when the hostility can only be inferred, and is not objectively observed, score under Attempt to Get Attention or Neg. Lead (see Scoring decision, Problem 6).

Problem 9

Leading peers - negative

Page 345— (Leads in Peer Activities)—Pos.—Neutral—Neg.)
"The authors give many examples of verbal leads, but do not separate them into positive, neutral and negative categories. They state, 'The child's verbal or physical directive to a peer may be positive, neutral or negative depending on the content of the directive and the affect expressed . . . affectionate, matter-of-fact, or hostile.' In the preceding paragraph in the Manual they also state that 'strongly worded commands that indicate hostility are scored under Hostility to Peers rather than Lead—Neg'."

Comment

There is not a satisfactory definition of a Negative Lead in the Manual. We cannot assume that the term negative refers to the semantic negative.

Example: "Do *not* shut the door." "*Don't* go away." Although these two directives are negative semantically, according to the Manual, they could be positive, neutral or negative depending on tone of delivery. A workable definition of the term Negative Lead is necessary.

Definitional decision

A Negative Lead is defined as a verbal or physical directive which is aversive to the physical or emotional well being of the peer being directed. It also demands physical action of P (p. 348).

"Get out of here!"
"Go away!"
"Get off my blanket!"
"Give it back to him. It's his!"
"You can't play with us."

Problem 10

Involved observation

Page 346— (Follows Lead of Peer—Peer Gives No Directions, 7a)
"When S is obviously 'caught up' visually with peer's behavior, he gets a score under this section. S watches intently as P paints, for example." (involved observation)

Comment

The meaning of the term "caught up" is not sufficiently concrete to insure reliable scoring in the category of Involved Observation.

Definitional decision

Involved Observation is defined as follows: S's constant observation of P's activity to the exclusion of S's own activity or surrounding distractions for a count of four seconds or more.

Problem 11

Refuses to follow peer

Page 347— (Refuses to Follow or Ignores Peer's Directions) "This section is used to tabulate S's refusals to follow peer's directions."

Comment

There are occasions when a child will not only refuse to follow the directive of a peer, but will also refuse to answer questions.

Scoring decision

This category is used to score those instances when S ignores or refuses to answer the questions of P.

Problem 12

Competing

Page 349— (Competes with Peers for Adult Attention) "S's overt competitive behavior is scored in this section. Unlike some of the other sections, this one demands on-the-spot interpretation of the behavior with the aid of situational and behavioral cues."

Comment

The authors do not describe in enough detail exactly which situational and behavioral cues are to be used in deciding whether to score a behavior as Competes with Peers for Adult Attention instead of just Attempts to Get Adult Attention.

Scoring decision

Whenever a child attempts to get the attention of an adult and in so doing diverts the adult's attention away from another peer or peers, this is to be scored as Competes with Peers for Adult Attention rather than Attempts to Get Adult Attention. This will usually occur in (a) any circle situation where the adult is reading, talking, singing, etc. with a group of children; (b) any situation (playground, paint table) where the teacher is engaged in the same occupation or in a discussion with one or more children.

Problem 13

Competing

Page 349— (Competes with Peers for Adult Attention)

Comment

The guidelines for scoring behavior in circle-like or other classroom situations in which a teacher is present are inadequate. Further definitions of those behaviors that should be scored as Competes with Peers for Adult Attention in such situations are required.

Scoring decisions

(a) If the teacher is expecting most of the children to respond to a question and S responds with the others—no score. S is not overtly competing, he is just following the direction of the teacher.

Example: T, "What did Jack find at the top of the beanstalk?" Children, "A giant."

(b) If the teacher is expecting only one or two children to know the answer to a question and S responds—score Competes with Peers for Adult Attention (successful or unsuccessful).

Example: T, "Does anyone know the name for a baby goat?" S, "A kid."

(c) If S spontaneously makes a remark directed to an A in a circle or classroom situation—score Competes with Peers for Adult Attention (successful or unsuccessful).

(d) If one or more children in the circle respond to a question and then S repeats this response—score Follows Lead of Peer rather than Competes with Peer for Adult Attention. While the child might be competing, the predominant behavior is that of Following.

(e) If S asks a question of an adult in a circle situation—score Competes with Peers for Adult Attention rather than Uses Adult as Resource (Scoring decision, Problem 1-b). After S has competed for A's attention by asking a question, any additional conversation or questions will be scored as Attempts to Get Adult Attention or Resource.

Problem 14

*Competing*

Page 349— (Competes for Equipment)
"This competition may be a silent tug-of-war over a toy, a verbal argument or a combination of verbal and physical competition. S may or may not have possession of the item at first."

*Comment*

The authors do not tell us whether to score all verbal leads and follows during the course of the competition. However, since we have been told to avoid double scoring, we assume that the competition takes precedence over the verbiage (Scoring decision, Problem 1-c).

In our observations, many instances occur in which a peer starts a competition and S does not react.

Example: Peer grabs shovel out of hand of S and says, "Give me that." S lets peer take the shovel.

*Scoring decision*

When S does not respond to competition initiated by P, score Follows Lead of Peer rather than Competes with Peer.

Problem 15

*Expressing pride*

Page 350— (Pride in Product-Creation and Pride in Attribute)
"S says to P, 'Look at my picture'."

*Comment*

Preliminary interobserver reliability indicated that observers had difficulty discriminating between Acts of Pride and Attempts to Get Attention. Frequently, it can be only inferred that pride is being shown.

*Scoring decision*

Double score Pride and Attempts to Get Attention.

Problem 16

Playing an adult role

Page 350— (Adult Role Play, 17b)

> *"Occasionally S may take on the role of an animal that is analogous to a human role such as Mama or Papa Bear in 'The Three Bears.' When this occurs, the observer can score S's role as Adult Role Playing."*

Comment

Children seldom are so kind as to take on easily identifiable roles such as Mama Bear. Instead, they adopt roles such as Spiderman, Batman or Mommy dog or cat.

Scoring decision

Only when an animal role actually mirrors or is similar to a human adult role can a score be placed in Adult Role Play.

Example: S, "Mommy cat is biting everyone."—no score.

Example: "I'm the daddy dog and I'm going off to work."—score Adult Role Play.

Problem 17

Playing an adult role

Page 350— (Adult Role Play, 17a)

> *"Frequently, adult role playing can be seen when S dresses up like an adult. In school, a subject may wear a man's coat and hat. No verbal conversation is necessary for S to get a score."*

Comment

Children frequently put on fireman hats or hard hats which are provided for them on the playground, without actually adopting the role suggested by the hat.

Example: S puts on fireman's hat and then goes over to the teeter-totter for the next 15 minutes.

Scoring decision

The wearing of adult clothing is in itself not sufficient justification for a score of Adult Role Play. Additional situational or behavioral cues are necessary to receive a score.

Example: S puts on hard hat and starts digging an imaginary hole.—score Adult Role Play.

Example: S puts on fireman's hat and then goes over to the teeter-totter for the next 15 minutes.—no score.

Social Competence: Scoring Information *(pp. 356-359)*

(a) Page 358— The last sentence of the first paragraph on this page which deals with scoring Leading and Following Peers is ambiguous. To clarify it, read as follows: "and finally, the subject received a bonus of 2 points if overall leadership attempts outweighed the (number of) Following (events)."

(b) Calculation of ratios when one of the event scores is zero.

Comment

In calculating some of the category scores, ratios of successful to unsuccessful attempts are used. For example, for the category Getting an Adult's Attention the ratio of successful to unsuccessful attempts (up to a maximum of five) is added to the score. A difficulty arises when the score for one type of event (e.g., unsuccessful attempts) is zero.

Scoring decision

In cases such as the above, for the purpose of calculating the ratio, substitute 1 for zero.

Appendix B

SOCIAL BEHAVIOR CHECKLIST
UWO PRESCHOOL

Adult					**Peer**	
Positive	**Negative**				**Positive**	**Negative**
		S	**ATTEMPTS TO GET ATTENTION**	S		
		U		U		
Instrumental	**Emotional**				**Instrumental**	**Emotional**
		S	**USES AS RESOURCE**	S		
		U		U		
Affection	**Hostility**				**Affection**	**Hostility**
			AFFECTION AND HOSTILITY			
			PRIDE			
			PLAYS ADULT ROLE			

Subject ____________________
Date ____________________
Time of Day ____________________
School ____________________
Coder ____________________
Recorder ____________________
Sex ____________________
Age ____________________
Group ____________________

		Adult attention + Equipment	
COMPETES WITH PEERS	S		
	U		
		+ neutral	
LEADS	S		
	U		
FOLLOWS			
FAILS TO FOLLOW			

Appendix C

SCORING MANUAL[1] FOR THE PEER INTERACTION, QUALITY-EFFECTIVENESS SCORE (PI,Q-ES), 1979 REVISION

(Peer social-influence effectiveness:
A measure of the social competence of preschool children)

The PI,Q-ES is a measure of the social competence of children in a preschool setting. It is designed for use with children aged three to six years. It is based on the frequency with which children's positive (or neutral) social influence attempts with their peers are successful.

An event sampling procedure is employed. Events are recorded on a checklist. Eleven types of events which are included in three categories of initiated social-influence attempts are scored. These are positive and successful attempts (a) to use a peer as an instrumental resource (events 1-3 as shown on the attached checklist); (b) to lead or direct a peer (events 4 and 5) and (c) to gain a peer's attention (events 6-11). This manual provides behavioral definitions of each of the types of events to be scored and a copy of the checklist which must be used.

General Scoring Rules

1. Not all social interactions of an S are scored. Events not scored are as follows:
   (a) Competitive events (i.e., interactions which occur when an S is actively engaged in a competition with P over possession of a toy or a piece of equipment).
   Example: P has possession of a truck. S says, "Give me that truck" and grabs for it. He gets it but P grabs it back. They struggle over the truck and S continues to demand that P give it up. S finally asks for the truck and P gives it to him.
   Although S is directing a peer and finally is successful, because competition is involved it is not scored.
   (b) Verbal interaction events which occur during the course of a conversation. Only the initiation of the conversation is scored (starts conversation). If, however, the conversation terminates and

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[1] This manual was prepared by Wright in collaboration with Ada Meecham. Ms. Meecham was the senior observer and the supervisor of all other observers on the research team involved in developing this measure. She worked on the project from its inception, for six academic years.

then S starts it up again by, for example, pointing to something or asking a question and the peer responds, this event is also scored. (c) Interaction events not initiated by S are not scored (e.g., following or imitating a peer, refusing to follow or imitate a peer, answering questions asked by P or refusing to answer).

2. Each time the subject performs a scorable event it should be recorded on the checklist in the appropriate cell.
3. A scorable event is a peer interaction in which S initiates the interaction by displaying any one of the 11 behaviors (as defined below) which are listed on the checklist, enacts the behavior in a positive or neutral (non-hostile, non-negative) way and is successful (i.e., the P responds in an appropriate way).
4. Each scorable event is scored only once (i.e., events are not double scored). If an event fits the definition of two scorable events, it is scored as the event which is listed highest up on the checklist (i.e., closest to the top of the checklist).
   Example: S is playing with P. S says to P, "Will you tie my shoe?" (P ties shoe.) Then P says, "I like to tie shoes." This could be scored as starts conversation or seeks help. Record as seeks help (the event listed closest to the top of the checklist).
   When an interaction is initiated (such as the one described above which fits the definition for two interaction events) and it is not scorable in the appropriate cell on the checklist because it is unsuccessful or negative, it is not recorded in any cell.
   Example: S says to P, "Will you tie my shoes?" P says, "No, I can't tie shoes." This must be scored as seeking help (rather than starts conversation). It is an unsuccessful attempt to obtain help and is therefore not scored and it is not scored as starts conversation.
5. Each scorable event which occurs in a behavioral sequence is recorded.
   Example: S moves toward P and P looks. S calls to P and P acknowledges. S asks help from P and P gives help. Each one of these events is scored.

Definitions of Scorable Events

1. Seeks Support from P
   S seeks support from P in peer disputes and when making declarations.
   Example: "This is my bike, isn't it Johnny?" "I'm stronger than he is, aren't I Bill?"
   Positive (neutral): the approach is friendly or matter-of-fact (i.e., free from aggression or hostility).
   Successful: a question which seeks support of P is successful if P offers support by word (says yes), gesture (nods in the affirmative)

or champions S's cause (helps S keep possession of bike). If support is not obtained, the interaction is unsuccessful and is not scored.

2. Seeks Help from P
   Questions which are used to obtain help are scored as seeking help rather than seeking information (see #3 below).
   Example: "Will you tie my shoes?" "Will you hand me the hammer?"
   Positive (neutral): same as defined in #1 above.
   Successful: a question which is a request for help or action is successful only if the requested help is given or the action the P was asked to perform is carried out. If help is not given and the action is not performed, the interaction is unsuccessful and is not scored.
3. Seeks Information from P; includes most questions (see #1 and #2 for exceptions).
   S requests information or explanations from P.
   Example: S asks P, "What are you doing?" "Will you play with me?" "Where is the lid?" "Do you like me?" "Why did you make Billy cry?"
   Positive (neutral): same as defined in #1 above.
   Successful: a request for information (a question) is successful only if the information is given. The information does not have to be accurate, but some attempt to provide the information must be made. If the P makes no attempt to answer or provide information, the interaction is unsuccessful and is not scored.
4. Directs P Verbally
   This includes all attempts by S to verbally lead or influence the behavior of a peer. S tells P to do something or verbally suggests that P participate in an activity.
   Example: "Close the door" "Come over here" "Give him the shovel" "Let's pretend we're dogs" "Let's play with the beads."
   Positive (neutral): the directions are given in a friendly or casual, matter-of-fact way. Directions or leading behavior which is hostile, aggressive and threatens the well-being and freedom of the P are defined as negative and are not scored. Examples of unscorable negative verbal behavior are "Get out of here" "You can't play with me" "Get away from us, we don't like girls."
   Successful: P does what he is asked to do.
5. Directs P Physically
   S physically directs P into a behavior or activity.
   Example: S takes P by the hand and leads him over to a play area (gently nudges P over to sandbox).

Positive (neutral): friendly urging of P. Physical directives which are hostile and threaten the well-being of P are defined as negative and are not scored.
Example: S pushes P into wall, S pulls P so fast he falls.
Successful: P follows the physical guidance of S and does what S wants him to do.

6. Acts Silly to P
This includes "silly" behavior used to gain the attention of P.
Example: making faces or strange noises and gestures, posturing, flipping water or paint, jumping up and down.
Positive (neutral): same as defined in #1 above.
Successful: the P toward whom the behavior is directed pays attention (i.e., responds in some way, e.g., looks, responds verbally, smiles, laughs, gestures, reaches out, touches, imitates).

7. Starts Conversation with P
This includes any attempt to initiate a conversation with P about things that P is not focusing on (i.e., "I went to the zoo yesterday," "My dad is stronger than your dad.").
Positive (neutral): friendly or matter-of-fact statements. If S starts a conversation by saying, "I hate you," "You're not my friend," this is negative attention-seeking and is not scored.
Successful: same as defined in #6 above.

8. Shows Something to P
This includes all attempts to get the attention of a peer by showing something.
Example: "Look at my drawing." "See how dirty the pail is."
Positive (neutral): same as defined in #1 above.
Successful: same as defined in #6 above.

9. Calls P
Each time S calls P's name to get P's attention (and S is successful) is scored but if the calling is perseverative (i.e., "Jimmy, Jimmy, Jimmy" with no pause between the calls) only one score is recorded. When there are pauses of two seconds or more between calls, each call may be scored.
Positive (neutral): same as defined in #1 above.
Successful: same as defined in #6 above.

10. Touches P
This includes any attempts by S to gain the attention of P by tapping on shoulder, pulling at clothing, hugging, kissing, patting, friendly poking, etc.
Positive (neutral): friendly and matter-of-fact approaches. Hitting is defined as negative behavior and is not scored.
Successful: same as defined in #6 above.

11. Moves Toward P
    S moves toward and stands or sits near P (no score is given if S just happens to be near P and shows no attention-seeking behavior).
    Positive (neutral): the approach is friendly or matter-of-fact (i.e., free from aggression or hostility).
    Successful: same as defined in #6 above.

Illustrations of How Sequences of Interaction Events Are Scored

1. S and P are coloring. S says to P, "Johnny, (calls) you can use my purple crayon (initiates conversation). P takes crayon. [Successful calls and starts conversation—score 2] S says to P, "Do you like coloring?" (seeks information). P says, "Yes, do you?" [Successful seeks information—score 1] S says, "It's what I like to do the most." They work quietly at the table. S says, "Johnny, give me back my crayon now" (verbally directs). P gives him back his crayon. [Successful verbal direction—score 1] S says, "Now give me your green crayon" (verbally directs). P says, "No." [Unsuccessful verbal direction—no score] S says, "Get away from my table, get out of here" (verbally directs). P goes away crying. [Negative verbal direction—no score]
2. S calls P (calls). P looks. [Successful calls—score 1] S says to P, "Let's play in the dollhouse" (directs verbally). Both children enter dollhouse. [Successful directs verbally—score 1] S says, "You be the mother, OK?" (seeks information). P puts on mother's hat. [Successful seeks information—score 1] S says, "You go shopping now" (verbal directs), "Take the car" (verbal directs), "I'm the baby, OK?" (seeks information). P says, "I'm the mother and I'm going shopping in the car but you're not the baby, you're the father, OK?" [Successful verbal directs—score 2] [Successful seeks information—score 1]
3. S says to P, "Let's play in the sandbox" (verbally directs). P says, "OK, come over to this part." [Successful verbal direction—score 1] S follows P. P says, "Give me the truck." S says, "No, I want the truck." P says, "Give me the pail then." S says, "You can have the pail." P says, "Look at my road." S says, "I don't want to." S is responding to P rather than taking the initiative, therefore, no score.
4. S is playing in sandbox with P. S says to P, "Can I play with the red truck?" (seeks information). P says, "Yes." [Successful request for information—score 1] S says to P, "Give me the green truck now" (directs verbally). P gives him the truck. [Successful verbal direction—score 1]

5. S is playing with P. S says to P, "Do you like me?" (asks for information). P says, "No, I don't." [Successful request for information—score 1]
6. S calls to P (calls). P does not respond in any way. [Unsuccessful call—no score] S then taps P on shoulder (touches) and says, "I went to the zoo yesterday" (attempts to start conversation). P says, "I have never been to the zoo. [Successful touch and starts conversation—score 2]
7. S calls to P (calls). P does not respond in any way. [Unsuccessful—no score] S then runs up to P (moves toward) and hits P with shovel (touches). P cries. [Negative moves and touches—no score]
8. S walks up to P (moves toward), taps him on the shoulder (touches) and says, "Will you help me move my chair?" (seeks help). P says "No." [Successful moves toward and touches—score 2] [Unsuccessful in seeking help—no score]
9. S walks over to P (moves toward), calls P's name (calls) and says, "Look at the picture I drew" (shows). P looks. [Successful moves, calls and shows—score 3]

PI,Q-ES CHECKLIST

Subject ____________________
Date ____________________
Time ____________________
Setting ____________________
Observer ____________________

Event	Positive (or Neutral) and Successful	Score
1. Seeks Support from P		
2. Seeks Help from P		
3. Seeks Information from P		
4. Directs P Verbally		
5. Directs P Physically		
6. Acts Silly to P		
7. Starts Conversation with P		
8. Shows Something to P		
9. Calls P		
10. Touches P		
11. Moves Toward P		
TOTAL SCORE		

Comments

8

Summative Evaluation: The Immediate Impact—Method and Preliminary Analyses

The first phase in the summative evaluation of the program focused on its immediate impact on the children while they were still enrolled in the preschool. The second phase focused on the program's long-term impact in the primary grades. In both phases our primary objective was to assess the compensatory effects of the program on children from low-income families.

METHOD

In the first phase, the design of the study for measuring compensatory effects was unusual because *internal* rather than *external* comparison groups were used. The target group of low-income children consisted of youngsters who were enrolled in the preschool as three-year-olds and attended for two years, and there were two comparison groups. One consisted of high-income children who were the same sex and age, and enrolled in the preschool at the same time as the children in the target group. The other consisted of low-income children who were enrolled in the preschool as four-year-olds and attended for only one year. The use of internal rather than external comparison groups had the advantage that it permitted greater control of teacher and program variables. However, the use of high-income children as controls presented special challenges which are discussed below.

The usual method of assessing a program is to compare the achievements of the children enrolled in it with those of children of the same socio-economic status, who have had no early education, or have been exposed to a different type of program. This method was used in the second, but *not* the first phase of evaluation, for two reasons. First, it proved impossible to find suitable control subjects in an appropriate setting. Persistent efforts were made to locate low-income subjects in local day nurseries, but the ones found were generally of higher socio-economic status than the low-income children in the preschool. Second, the attrition rate in the sample of subjects finally selected was too high. Of 45 potential day-nursery controls who completed the first full assessment, only 10 were still in the nursery seven months later when it was time for the second assessment, and none could be found by the third assessment time.

The major challenge we faced in utilizing a high-income comparison sample was to predict the kinds of results which would provide acceptable evidence that compensatory effects in the low-income children had been obtained. This challenge was addressed from a theoretical, and to the extent possible, from an empirical point of view. First, we assumed that all aspects of development in the preschool would depend on the interaction of both hereditary and environmental factors. Because of the extensive body of literature available on socio-economic differences in ability, we recognized that the high-income subjects, who, like the low-income subjects were selected without pre-testing, might have more potential for learning than their low-income counterparts. If this turned out to be the case, we expected that, given equal opportunities for learning, the performance gains made by the high-income children would exceed those made by the low-income children; small initial differences would increase over time, and differences not initially present, because of a lack of relevant experience in both income groups, would appear. We also recognized, because of the abundance of information about socio-economic differences in parental practices, that the high-income children might be better prepared than the low-income children, from an experiential point of view, to benefit from the preschool program, and that this too might have the effect of increasing the differences, over time, between the income groups. Consideration of the possibilities from these two points of view led us to conclude that compensatory effects for the low-income children could be inferred if the differences between them and the high-income children *did not increase* over time.

There was some evidence, however, which suggested that the preschool might have a minimal impact on the abilities of the high-income children. It has been found that preschools, which have improved the abilities of low-income children, have had no measurable effects on the abilities of high-income children, presumably because the parents of the latter and the preschool teachers taught the same things (Miezitis, 1973). A minimal impact on intelligence also seemed likely if the amount of home-based stimulation received by the high-income children was sufficient to bring their performance up to levels which were consistent with their potential. If both of these conditions applied, then the high-income group would constitute an ideal comparison group, stable with respect to intelligence and cognitive stimulation and reflecting, in performance gains, only the effects of changes in age.

The notion of "compensatory" implies that low levels of achievement in low-income children are due, in large measure, to a lack of sufficient and appropriate cognitive stimulation rather than to limitations in potential, and that the differences between low- and high-income children which have been observed, reflect, in part at least, differences in opportunities for learning and development in their respective environments. If this were the case in our samples, then we expected that the low-income children would make greater gains than the high-income children and that the size of the differences between them would decrease over time. If such "catching up" of the low-income children occurred, this would provide the most convincing evidence that compensatory effects had been achieved.

The second comparison group, which consisted of low-income children who were not enrolled in the preschool until they were four-year-olds, was used to assess the impact of the target group's first year in preschool; the immediate impact of the program on low-income children when they were enrolled in it at age four, rather than at age three; and, in the follow-up study, to assess the long-range effects of one as compared with two years of preschool experience.

Subjects

The subjects were 80 three- and four-year-olds; 40 from low- and 40 from high-income families. All were English-speaking, and all were white except five in the low-income sample, four of whom were native (Indians) and the fifth a dark-skinned child of unknown ethnic origin. These subjects represented two main groups: Group A which consisted of children who were enrolled in the preschool as three-year-olds and Group B which consisted of children who were enrolled as four-year-olds.

Group A. This group included 60 children (25 from low- and 35 from high-income families). All 60 were studied in their first preschool year and 50 of them (24 low- and 26 high-income) were re-enrolled in the program for a second year and studied again. They represented three subject cohorts who entered the preschool in the first (Cohort 1), second (Cohort 2) and third (Cohort 3) year of the project respectively. The subjects in this group are described by cohort, income sub-group, sex, age and socio-economic status (SES) index (Blishen, 1967) in Table 6.

The cohorts varied in size and in the proportion of boys to girls and low-income to high-income children in each. This was due to difficulty in finding low-income subjects who met the criteria in any given year. Also the constitution of the cohorts changed by year in preschool because of attrition. However, the total samples of high- and low-income children, when the cohorts were combined, were fairly well balanced for age and sex in both their first and second preschool year.

Group B. This group consisted of 20 subjects, 15 low- and 5 high-income children. In the low-income sample there were nine boys and six girls. Mid-year attrition accounted for the poor balance for sex in this sample. In the high-income sample there were five boys. There were no high-income girls because none who met the criteria were enrolled in the preschool.

The years in which the Group B subjects were in the program varied. The low-income children were enrolled as follows: one in each of the first two years of the project, seven in the fourth, five in the fifth, and one in the sixth year. Of the high-income children two were enrolled in the fourth and three in the fifth project year.

The mean ages, at entry into the project, of the low- and high-income samples were 4.2 (*SD* .03) and 4.1 (*SD* .03) years, and their mean SES indices were 32.1 (*SD* 6.8) and 64.8 (*SD* 12.3) respectively.

Subject selection. All the subjects were selected without pretesting. The low-income children were chosen from among children recommended for the project by a variety of different social agencies. For these the selection criteria were as follows: low-income and low SES; no previous group care or education; no known sensory, mental or motor disability. The high-income subjects were selected from among the children in the preschool whose parents paid fees. For these the selection criteria were as follows: no previous group care or education; no known sensory, mental or motor disability; enrollment in the program in the same year as a low-income child of the same sex and age.

Socio-economic status. The actual incomes of the parents are not reported for two reasons. First, the high-income parents were not asked to reveal them, but for these parents they can be approximately inferred from the information available about their occupations. Second, the incomes of the low-income parents, who were not on a fixed

Table 6

Description of Group A by Cohort, Income Sub-Group, Sex, Chronological Age (CA) and SES Index

	First Year in Preschool							*Second Year in Preschool*						
				CA		*SES Index*					*CA*		*SES Index*	
	n	*Male*	*Female*	*Mean*	*(SD)*	*Mean*	*(SD)*	*n*	*Male*	*Female*	*Mean*	*(SD)*	*Mean*	*(SD)*
Cohort 1														
Low-income	9	3	6	3.18	(.281)	32.67	(6.86)	8	2	6	4.13	(.252)	30.50	(2.33)
High-income	8	3	5	3.07	(.265)	68.0	(10.33)	6	2	4	4.11	(.272)	68.33	(10.80)
All subjects	17	6	11	3.13	(.270)	49.29	(20.02)	14	4	10	4.12	(.250)	46.71	(20.62)
Cohort 2														
Low-income	4	3	1	3.29	(.293)	30.56	(3.06)	4	3	1	4.29	(.293)	30.56	(3.06)
High-income	13	7	6	3.24	(.264)	72.41	(8.03)	11	6	5	4.27	(.229)	71.81	(8.65)
All subjects	17	10	7	3.25	(.265)	62.56	(19.61)	15	9	6	4.26	(.246)	60.81	(20.29)
Cohort 3														
Low-income	12	6	6	3.33	(.223)	30.48	(5.03)	12	6	6	4.33	(.223)	30.48	(5.03)
High-income	14	7	7	3.16	(.241)	73.08	(6.91)	9	4	5	4.11	(.253)	72.52	(8.32)
All subjects	26	13	13	3.24	(.243)	53.42	(22.48)	21	10	11	4.23	(.255)	48.50	(22.28)
All Cohorts														
Low-income	25	12	13	3.27	(.255)	31.28	(5.37)	24	11	13	4.22	(.249)	30.50	(3.80)
High-income	35	17	18	3.17	(.255)	71.77	(8.11)	26	12	14	4.18	(.247)	71.25	(9.03)
All subjects	60	29	31	3.21	(.257)	54.84	(20.97)	50	23	27	4.21	(.251)	51.69	(21.22)

support program such as Mother's Allowance,[1] fluctuated widely depending, for example, on whether they were temporarily employed or on welfare, and it was not possible to monitor these fluctuations in any systematic or reliable way. However, the incomes of the low-income families can also be approximately inferred from their occupations.

The education and occupations of the "heads" of the families of all of the subjects (fathers in intact and mothers in single-parent families) are described by group and income sub-group in Table 7.

The number of single-parent, mother-headed families in the low-income samples was 13 (of the 25) in Group A and 13 (of the 15) in Group B. All of these were on Mother's Allowance, or on welfare and waiting to go on Mother's Allowance. None of them worked on a regular basis outside the home. In the high-income samples there were only two single-parent families (both in Group A). The mothers in these families were, however, highly trained and financially independent.

In the intact families in the low-income samples, all but one of the family heads had irregular employment histories. They worked at various types of jobs, usually for relatively short periods and then were unemployed. The occupations shown for them in Table 7 are the ones in which they were engaged for the longest, continuous, time period, although this was sometimes only a few weeks. In the intact families in the high-income samples the family heads were all regularly employed.

Information about the educational levels attained by the parents of the subjects was obtained during interviews with the parents, rather than from school records or other objective sources, although, in the case of most of the high-income families, it was simply inferred from the parent's occupation (e.g., for those in professions). There is reason to believe that the attainments claimed by at least some of the low-income parents were somewhat overstated.

Low-income subject source, family support and fee-funding. The agencies which referred most of the low-income children in the third and subsequent project years differed from the agency which referred the children in the first two years. This changed the amount of counseling and assistance the children's families received. This change was also accompanied by a modification in the way in which the children's fees (although not their transportation) were funded.

In the first two years of the project the children were recommended by a single Family and Children's Services Agency with which

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[1] The Mother's Allowance is a popular name for an allowance paid to single, divorced, separated or widowed women with dependent children under Section 71d of the Family Benefits Act of the Province of Ontario. It is a needs-test program, but guarantees an income 5 to 6% higher than is attainable from municipal welfare sources.

Table 7

Education and Occupations of the Family Heads by Group and Income Sub-Group

	GROUP A		*GROUP B*	
	Low-income (n = 25) % of 25	*High-income (n = 35) % of 35*	*Low-income (n = 15) % of 15*	*High-income (n = 5) % of 5*
Education				
Primary				
Less than grade 8	12.0	—	13.3	—
Grade 8	28.0	—	—	—
Secondary				
Grade 9 or 10	48.0	—	66.7	—
Grade 11 or 12	12.0	—	20.0	—
Post secondary				
Technical	—	8.6	—	20.0
BA degree	—	5.7	—	40.0
Advanced degrees	—	85.7	—	40.0
Occupations				
Never Employed	12.0	—	13.3	—
Unskilled Labor (factory, restaurant, construction)	48.0	—	53.3	—
Semi-skilled Labor (truck driver, painter, repairman, custodian, housekeeper)	24.0	—	6.7	—
Skilled Labor (soldier, clerk, telephone operator, hairdresser, bookkeeper)	16.0	—	26.7	—
Managers and Professionals (business and the arts)	—	11.4	—	60.0
Secondary School Teachers and Administrators and Graduate Students	—	20.0	—	—
Physicians, Lawyers, Engineers, and University Professors	—	68.6	—	40.0

close working relationships had been established. This agency appointed a Coordinator to work with the Project Director and agreed to provide any support or counseling that the families of the children might require. The social workers in this agency made the initial approach to the families and brought the parents to the preschool for preliminary visits and on their child's first day in school. They worked closely with the preschool staff and tried to implement any recommendations which were made for modifying the children's home conditions. In these years all of the children were funded through grants and were referred to as "scholarship" children. Their parents were, for the most part, proud that their children had been selected for these scholarships and were eager to support their progress. They responded positively to every request made by the preschool staff and all but one mother participated in the program activities which included parents, and in parent meetings, both frequently and actively. All of the families of the low-income children in

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the first two cohorts of Group A received this kind of support and treatment during both the first and second years that their children were in the program.

In the third project year, when the subjects in the third cohort of Group A were selected, the Agency referred to above could not provide the number of children required. Additional sources were therefore used, such as public health nurses and subsidized housing bureaus. All but four of the subjects in Cohort 3 were recommended by these new sources and, as a result, their families received little or no support and counseling other than that which was provided by the preschool. Furthermore, because of the size of Cohort 3, which included as many subjects as were in the first two cohorts combined, the funds available were not sufficient to provide them with full scholarships. Their fees were, therefore, partially financed by subsidies from the city, although their transportation was funded through grants, as it had been for the first two cohorts. The parents were required to apply for the subsidies. This procedure made it difficult to convey to these parents the feeling that their children were "special," and it was not as successful as the procedure used with the parents of the children in the first two cohorts in generating interest in their children's progress and preschool activities. Although these parents fully cooperated with the school on matters directly affecting their children it was difficult to involve them in preschool activities, even when transportation for them was arranged.

Other SES differences. The low-income subjects differed from the high-income subjects in that more of them had unstable parents who abused or neglected them, and more had undiagnosed sensory or other disabilities which required treatment.

Only one high-income subject was subjected to any known serious stress during the project and this was during a divorce proceeding. In contrast, in the low-income Group A sample, two children suffered abuse which resulted in charges being laid against their parents, and three others were made temporary wards of the Children's Aid and experienced a series of both institutional and foster home placements. Two others had mothers under psychiatric treatment, one because of a compulsion to destroy her child (our subject). Seventeen of the families were highly mobile; three moved five to six times, five moved two to four times and nine moved at least once while their children were in the preschool. The number and identity of the adults in these families, especially in the single-parent families, also tended to change frequently. The low-income families in Group B appeared to be more stable than those in Group A although, as was reported earlier, more of them were single-parent families.

Undiagnosed disabilities in two low-income children who were enrolled in the program were so severe that these children were not used as subjects. They were, however, kept in the program, and treatment for them was arranged. One was deaf and the other was seriously disturbed emotionally. In the Group A low-income subject sample two children had serious auditory and respiratory problems, which required surgery, and seven had articulatory difficulties which required special treatment outside the preschool. In the Group B low-income sample, one child had a severe speech and behavior disorder, two were serious behavior problems, one had a hearing deficit and a speech problem, and one had an articulatory problem—all requiring special treatment. In contrast, only two of the children in the high-income samples presented special problems and these were articulatory disorders which responded relatively quickly to treatment. There were five children of non-Caucasian origin in the study and all were in the low-income samples. Four were in Group A and these were native (Indian) children. The other was in Group B and was a darker-skinned child of unknown ethnic origin.

Assessment Policy

The tests and measures we employed were related to the program's goals. The question addressed was, did the children change over time in "desirable" ways as defined by the aims of the program? The goals of the program were described in detail in Chapter 2. The objectives on which the program was assessed were those concerned with the development of (a) intellectual and cognitive abilities, (b) effective learning and cognitive problem-solving styles and strategies, and (c) social competence with peers.

Standardized instruments were used whenever acceptable ones could be found, but two new measures, which were developed as part of the project, were also employed. The new measures were (a) a set of rating scales for measuring various aspects of problem-solving and cognitive styles and (b) an objective measure of social competence with peers. The development of the latter measure was a major research project in itself which is described in Chapter 7.

Although the standardized tests were related to the program's goals, the teachers did not "teach to the tests." They were given only general knowledge about the types of items which were included in them. They also had no knowledge about the target behaviors in the social competence measure, nor did the principal investigator, until the end of the project when the discriminating variables in the children's behavior had been conclusively identified. They did, however, have full knowledge about the rating scales, for they participated in their development.

The research staff and the teaching staff worked independently, without knowledge of each others' assessments of the children. The only feedback given the teachers by the principal investigator was about the group results obtained at the end of each year. As was explained in Chapter 6, this feedback was used to identify objectives not being achieved, and to suggest what aspects of the program needed to be modified.

The teachers were kept in ignorance of the items on the tests so that any increases in the children's test scores would reflect real development, which might be enduring, rather than superficial learning due to special tutoring, which might be transitory. They were kept ignorant of the children's test scores to prevent them from developing expectancies, which might modify their attitudes and behavior toward the children. Information about the Binet IQs of the children was sealed as soon as it was obtained and was not known by even the principal investigator until the children had "graduated" from the preschool.

Assessment Instruments

Intellectual and Cognitive Ability

Four standardized tests were used to assess achievement in this area. They were the Stanford-Binet Intelligence Scale (Terman & Merrill, 1973); The Preschool Inventory, 1970 edition; and two Circus tests, both Form A, "Say and Tell" and "How Much and How Many."

1. The Stanford-Binet Intelligence test is perhaps the best measure of its kind available for use with preschool-aged children, and it is the one which has been used most frequently to evaluate compensatory early education programs. It is generally considered to be an academic aptitude test because it is highly predictive of academic achievement. This test was not included in the test battery in the first project year, mainly because its use was resisted by the teachers, but it was used in each subsequent year when the teachers were assured that the results would be sealed until the children had "graduated."
2. The Preschool Inventory is a 64-item test which is heavily saturated with items which measure conceptual ability. It yields a total score based on four sub-test scores. The sub-tests are as follows: (a) Personal-Social Responsiveness—knowledge about the child's own world and the ability to get along with and respond to the communications of other persons, (b) Associative Vocabulary—

ability to demonstrate awareness of the connotation of a word by carrying out some action, or by associating to certain intrinsic qualitites of the underlying verbal concept, (c) Concept Activation-Numerical—ability to label quantities, to make judgments of more or less, to recognize seriated positions and (d) Concept Activation-Sensory—to be aware of certain sensory attributes (shape, size, motion, color) and to be able to execute certain visual-motor configurations.

3. Circus "Say and Tell" Form A is a language test. It yields scores on three kinds of language ability: (a) Description, (b) Functional Language and (c) Narration.

   Description is a measure of the child's ability to respond to direct questions and describe a pencil (e.g., "What do we call this?" "What color is it?") and a penny (e.g., "Tell me all about what you have in your hand."). Functional Language is a measure of the use of correct forms: plurals, verbs, prepositions, subject-verb agreement, comparisons, possessives. For each item there is a sample picture (e.g., a picture of one tree) and a response picture (e.g., a picture of two trees). The examiner says, "Here is a tree—Here are two ____" (trees). Narration is a measure of the child's ability to talk about or tell a story about a picture. The total number of words, the number of different words and the quality of the story (inclusions of verbs, modifiers, proper syntax, sequence, rhythm and description of characters and events) are scored.

4. Circus "How Much and How Many" Form A measures number concepts and abilities. It yields a total score based on three sub-scores for (a) Counting, (b) Relational Terms, (c) Numerical Concepts.

   Counting measures the ability to mark the picture in an array of three (or more) pictures which has, for example, "*three* lines," or the picture of seals which "goes with" a specified number, or the picture of the number which "shows" how many elephants there are. Relational Terms measures the child's ability to deal with size (e.g., identify the largest, smallest, shortest, longest); position (in, between, bottom); inclusion-exclusion (some, all, none); spatial ordination (first, middle, last). Numerical Concepts measures understanding of one-to-one correspondence (e.g., "Mark the picture that shows just one banana for each monkey"), numerical sequence (e.g., "Mark the number that comes before 3"), and the meaning of most, more, least, fewest (e.g., "Which clown has the most balloons?").

   The Circus tests were not administered in the first year of the project for they were not published at that time. They were, however, used in each subsequent year.

Problem-Solving Styles and Strategies

Three tests and a set of teacher rating scales were used to assess achievement in this area. The tests included two of the Circus battery, "Think It Through," Form A, and "Make a Tree," and the Kansas Reflection Impulsivity Scale for Preschoolers (KRISP), developed by John Wright (Note 1). The rating scales assessed six dimensions of behavior: (a) Self-Direction, (b) Mastery Motivation, (c) Self-Management, (d) Curiosity, (e) Creativity and (f) Imagination.

1. Circus "Think It Through" is a measure of problem-solving ability. It yields a total score based on three sub-test scores which measure (a) Problem Identification, (b) Classification and (c) Solution Evaluation.

   Problem Identification assesses the child's ability to identify the problem (e.g., "Mark the picture that has something wrong," or "Mark the picture that shows what happens first"). Classification measures the child's ability to mark the picture which "goes best" with a specified picture, or to mark the one which does not "go" with a specified sample. Solution Evaluation measures the ability to identify and indicate the picture representing a solution to a problem (e.g., "Clarence wants to get some cookies from a jar on a high shelf, but he can't reach it. Mark the picture that shows the best way to solve Clarence's problem").
2. Circus "Make a Tree" was designed to measure creativity. It assesses a child's ability to assemble, using a large pack of gummed stickers which vary in color and shape, a "novel" representation of a tree. The examiner places before the child, who is seated at a table, a white sheet of paper and the pile of stickers and says, "I want you to make a tree with these stickers on this paper. Make any kind of tree you like." The test is administered twice (on separate days) with the second test being given within one week of the first. On the second test, the child is asked to make another tree "just as different from the first one as you can." The trees are scored on Appropriateness (looks like a tree), Unusualness (novelty, imaginative or "different") and Difference (how much the two trees are alike or different).
3. The Kansas Reflection-Impulsivity Scale for Preschoolers (KRISP) presents a series of match-to-sample discrimination tasks. The child is presented with a sample picture and is asked to identify from among an array of alternatives the one that is "just the same" as the sample. To do this successfully, the child must scan efficiently and identify the distinguishing features. "Impulsivity" and "reflection" are operationally defined in terms of the time taken to respond (latency) and the number of errors made (errors). Chil-

dren who are relatively slow and accurate (i.e., have high latencies and low errors) are classified as reflective. Those who are relatively fast and inaccurate (i.e., have low latencies and high errors) are classified as impulsive. Normative data are provided for interpreting individual scores.

4. The rating scales were designed to assess learning and cognitive problem-solving styles by measuring the frequency (as judged by their teachers) with which children display behaviors defined in six categories: Self-Direction, Mastery Motivation, Self-Management, Curiosity, Creativity, Imagination. Appended to this chapter is a copy of the Manual (Appendix A), which provides elaborated definitions of the behaviors to be rated, and a copy of the Rating Form (Appendix B). The scales vary by number of behaviors on which the children are judged. However, the score for each scale is calculated as the mean of the ratings assigned on that scale. Thus, all scale scores have the same potential range (i.e., from 0 to 6).

   The scales were developed by the principal investigator with the help of teachers in the preschool and in two day nurseries. They were revised three times until ambiguities in the behavioral definitions were eliminated and reliable scores were obtained. Reliability was assessed by correlating the scores assigned to the same children by different teachers. In the first project year the reliabilities of the scores obtained on the subject samples did not meet the criterion on all scales, but, in the second and subsequent years, they did. The criterion was significant correlations between all teacher pairs at the $p < .01$ level. The correlations between the scores obtained in the second project year are shown by scale, assessment time and teacher pair in Table 8. In our project, four teachers rated each child on these measures and each child's scale score was the mean of the four scores thus obtained.

Social Competence

An objective observational procedure was employed to measure the social competence of the children with their peers. The set of criteria used to judge their competence was selected on the basis of the results of a four-phase study which was conducted as part of the project. This study was described in Chapter 7. Briefly, the overall criterion was the frequency with which the children initiated interactions with their peers, which were positive and successful social-influence attempts. The score derived for each child, based on the frequency with which the child initiated the target interactions was called the Peer Interaction, Quality-Effectiveness Score (PI,Q-ES). This score is a measure of the child's social-influence effectiveness.

Table 8

Correlations Between the Ratings Assigned to the Subjects by All Teacher Pairs on Each Scale at Each Assessment Time, in the Second Project Year

n = 34

Teachers	*Self-Direction*		*Mastery*		*Self-Management*	
	Fall	*Spring*	*Fall*	*Spring*	*Fall*	*Spring*
A & B	.637	.597	.568	.541	.707	.732
A & C(E)[1]	.697	.318 NS[2]	.762	.505	.747	.623
A & D	.765	.509	.769	.556	.681	.568
B & C(E)[1]	.787	.720	.699	.704	.777	.684
B & D	.630	.685	.714	.607	.712	.745
C(E)[1] & D	.661	.598	.788	.695	.775	.543
	Curiosity		*Creativity*		*Imagination*	
	Fall	*Spring*	*Fall*	*Spring*	*Fall*	*Spring*
A & B	.724	.439	.733	.628	.808	.453
A & C(E)[1]	.547	.367*	.768	.644	.664	.370*
A & D	.532	.665	.690	.641	.760	.458
B & C(E)[1]	.807	.535	.751	.680	.771	.505
B & D	.663	.580	.721	.608	.849	.522
C(E)[1] & D	.728	.557	.732	.748	.789	.473

*$p < .05$

[1] Teacher E = Substitute for C in spring

[2] NS = not significant

Data Collection Procedure

The subjects were assessed on all of the measures twice each year, in the fall, starting no sooner than one month after they were enrolled in the preschool (October-November), and seven months later in the spring (May-June). The duration of each assessment period was four to six weeks.

The subjects were tested, and their social behavior was observed, in alternate weeks, and the rating scales were completed in the first four consecutive weeks of each assessment period.

The tests were administered in a random order except that either the Preschool Inventory or the Stanford-Binet Intelligence Scale was given to each subject on his or her first test day, and these tests were always administered at least one week apart. At each assessment time the Binet was given first to half of the subjects and the Preschool Inventory was given first to the other half of the subjects in each group.

The tests were given to each child in the same order in the spring as in the fall.

All tests were administered, individually, in a small special-project room in the preschool, which was familiar to the subjects. There were two testers who administered all of the tests, except "Make a Tree" which was given by part-time teachers. The two testers were mature women and both were experienced psychometrists. They both worked on the project throughout its duration. Thus, each test, except Circus "Make a Tree," was given to all of the subjects by the same tester.

The rating scales were completed for each child by four teachers. Each teacher rated one quarter of the subjects during each week in the first four weeks of each assessment period. Thus, each child was rated in each of the four weeks, but by a different teacher.

The observers and the observational procedures used to study the social behavior of the children were described in Chapter 7.

PRELIMINARY ANALYSES

Before final decisions could be made about how the data should be analyzed for compensatory effects, it was necessary to determine whether the two variables which were modified during the project, and the one variable in the children, which was not controlled by subject-selection, affected performance. The variables which were modified during the project were (a) the educational program, as described in Chapter 6, and (b) the referring agencies and fee funding of the low-income children as described earlier in this chapter. The variable which was not initially controlled in the selection of the subjects was "ability" (IQ). No pre-testing was done, because it was expected that such testing would provide misleading results with at least the low-income children. However, after the children had been in the program for at least one year it became apparent that they differed widely in ability and that this might be affecting their responses to the program in highly important ways.

Program Modification Effects

To determine whether the changes made in the program during the first three years had any measurable effects, the achievements of the three cohorts in Group A, which entered the program in the first, second and third years of the project respectively, were compared. Only the 50 children who were enrolled in the program for two years were included.

Scores on tests and measures obtained on the subjects in both their first and second preschool years were subjected to a series of 2(Year) x 2(Time) x 3(Cohort) x 2(SES) x 2(Sex) ANOVAs and no significant main effects for Cohort were found.

Because some tests were not administered to all of the subjects until their second preschool year, the data for the second year in preschool were re-analyzed separately and subjected to a series of 2(Time) x 3(Cohort) x 2(SES) x 2(Sex) ANOVAs. These yielded only one main effect for Cohort and this was on a sub-test score.

Because only one Cohort effect, among so many (33) possibilities, was found, it was considered spurious. It was, therefore, concluded that the changes in the program had had no measurable immediate effects on performance.

Subject Source, Family Support and Fee-Funding Effects

To determine whether less family support, and being a subsidized rather than a scholarship child, had any effects on the achievements of the low-income children, the 12 "scholarship" children (Cohorts 1 and 2) and the 12 "subsidized" children (Cohort 3) in Group A were compared.

Simple t-tests were used to measure the significance of the difference between the mean scores of these samples on all measures at each assessment time. Only two significant differences were found and these were on sub-test scores on two different measures.

Because only two significant differences were found, among so many (132) possibilities, they were considered spurious. It was, therefore, concluded that differences in the amount of family support provided and differences in the fee-funding arrangements, had no measurable immediate effects on the performance of the low-income children.

Ability Effects

Group A Ability

There were wide individual differences in the apparent native ability of the subjects, as measured by their Binet IQs. In order to measure the effects of ability on performance, the 24 low-income subjects in Group A who were in the program for two years, were divided into two ability sub-groups, with 12 subjects in each, on the basis of the *means* of the two IQ scores they obtained in their *second* preschool year. The mean IQs of the two sub-groups thus obtained were 106.9 (*SD* 7.2, range 99.5-123) and 89.5 (*SD* 8.35, range 70.5-99.0). The difference between these means, of 17.4 IQ points, was highly significant ($t\,[22] = 5.5, p < .001$).

These two ability sub-groups were well balanced for sex and cohort. In the group with more ability there were five boys and seven girls and six were "scholarship" children (in Cohorts 1 and 2) and the other six were "subsidized" children (in Cohort 3). In the group with less ability there were six boys and six girls and six were "scholarship" children (in Cohorts 1 and 2) and six were "subsidized" children (in Cohort 3).

The high-income subjects in Group A were, as a group, above average in ability, although the range of their IQ scores was wide. Only one of the 26 subjects who were in the program for two years consistently scored below average (below IQ 100) and over 80% of them consistently scored above average (above IQ 110). The mean Binet IQ of this group, based on the means of the two scores the children obtained in their *second* preschool year, was 116.7 (*SD* 11.1, range 89.0-133.5). The difference between this mean and the mean score (106.9) of the low-income sub-group with the most ability was 9.8 points. This difference was significant (t [36] = 2.8, $p < .01$).

Thus, in Group A, there appeared to be three distinguishable ability sub-groups; one with high-ability (the high-income children), one with average ability (the low-income children with the highest IQs) and one with low-ability (the low-income children with the lowest IQs). In the average-ability group, as defined above, there was only one child who obtained an IQ of over 110 at both assessment times, and in the low-ability group there were only two children who obtained scores above 90 at both assessment times in their second preschool year.

To determine whether ability, as measured by IQ, had an effect on performance, the achievements of these three ability groups were compared. A series of 3(Ability Group) x 2(Year) x 2(Time) x 2(SES) x 2(Sex) ANOVAs were performed on all of the scores derived from all of the tests and measures of intellectual and cognitive ability and cognitive styles. Significant main effects of Ability Group were found on all of the ability tests, and on all of the cognitive styles tests except one sub-test of "Think It Through" (Problem Identification), two of the three scores on "Make a Tree" (appropriateness and difference), one of the two scores from the KRISP (Latency) and one of the six rating scales (Curiosity and Exploration). A summary of the significant main effects of Ability Group on these measures is presented in Table 9.

These findings indicated clearly that ability, as measured by the Binet was an extremely important variable which could not be ignored.

Group B Ability

The ability of the low-income sample in Group B was average, and about the same as that of the Group A low-income, average-ability sub-group. In their second year in school (kindergarten) only 12 of the 15

Table 9

Summary Table of Significant Main Effects for Ability Group

Test	*Sub-test*	*F*	*df*	*p*
Binet IQ		32.5	2,47	.0000***
Preschool Inventory	Personal/Social	29.9	2,44	.0000***
	Associative/Vocabulary	10.7	2,44	.0000***
	Concept Numerical	21.8	2,44	.0000***
	Concept Sensory	34.9	2,44	.0000***
	Total	35.3	2,44	.0000***
"Say and Tell"	Description	13.6	2,47	.0000***
	Total Functional Language	26.8	2,30	.0000***
	Number of Different Words	3.5	2,30	.0417*
	Quality	4.9	2,30	.0149*
"How Much and How Many"	Counting	11.8	2,30	.0002***
	Relational Terms	13.2	2,30	.0001***
	Numerical Concepts	9.21	2,30	.0008***
	Total	15.2	2,30	.0001***
"Think It Through"	Problem Identification	2.7	2,30	.0845 NS
	Classification	9.14	2,30	.0008***
	Solution Evaluation	19.4	2,30	.0000***
	Total	14.4	2,30	.0001***
"Make a Tree"	Appropriate	2.4	2,47	.1063 NS
	Unusual	3.9	2,47	.0276*
	Difference	1.8	2,47	.1817 NS
KRISP	Errors	9.0	2,47	.0005***
	Latency	.2	2,47	.7890 NS
Rating Scales	Self-Direction	3.2	2,47	.0501*
	Mastery/Motivation	5.8	2,47	.0055**
	Self-Management	5.8	2,47	.0054**
	Curiosity & Exploration	1.9	2,47	.1608 NS
	Creativity	10.5	2,47	.0002***
	Imagination	3.2	2,47	.0495*

$^{***}p < .001$

$^{**}p < .01$

$^{*}p < .05$

NS = not significant.

subjects in this sample were still available for study, but they included all of the subjects with the lowest preschool-level IQ scores. The mean IQ of these 12 subjects, based on the means of the two scores they obtained in their kindergarten year, was 106.3 (*SD* 7.9, range 97.5-124.5). There was no significant difference between this mean and the second-year-in-preschool mean score (106.9) of the Group A low-income, average-ability sub-group.

It was concluded from these findings that the Group B low-income sample could be regarded as an average-ability sub-group, comparable to the Group A low-income, average-ability sub-group. In the Group B low-income sample only two of the 12 children had IQs of over 110 at both assessment times in their kindergarten year.

The high-income subjects in Group B were not tested in kindergarten, but they constituted a high-ability sub-group. At the end of their one preschool year, their mean IQ was 121 (*SD* 9.3, range 108-130) and only one of them had a score below 110.

Discussion and Conclusions

The finding that the modifications made in the program during the first three years had no measurable effects on the performance gains made by the children may have been due to the size of the cohorts compared. However, many different types of preschool programs have been equally successful in producing immediate performance gains in young children (Weikart, 1970 & 1972) and, in view of this, our results were not surprising. They suggest that the overall quality of the program was about the same throughout the whole project, including the start-up year. Finally these results indicated that in any further analyses, the cohort variable could be ignored and the cohort data could be combined.

The finding, that the differences in the services provided for the families of the "scholarship" and "subsidized" low-income children had no measurable effects on the immediate gains made by them, was reassuring. This was especially so because the Head Start literature has put much stress on the importance of support for the families of children in compensatory early education programs if satisfactory results are to be achieved. Furthermore these results indicated that, in any further analyses, the data for the scholarship and subsidized children could be combined.

The finding that ability, as measured by the Binet IQ, was such a powerful variable in predicting achievement led to the conclusion that in any analyses of the data for compensatory effects this variable could not be ignored. Since, in the preliminary analyses it was found that the children who were in the program for two years (Group A) could be successfully divided into three ability sub-groups, and that the low-income children who were in the program for only one year (Group B) constituted a sub-group comparable in ability to the average-ability sub-group in Group A, it was decided that these four sub-groups should become the four main groups in the analyses of the data for compensatory effects.

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Appendix A

MANUAL FOR THE UWO PRESCHOOL BEHAVIOR RATING SCALE

General Instructions:

1. The purpose of this scale is to assess the *non-social* adaptive abilities or competence of the child.
2. You are asked to rate 0-6 on each item according to the frequency with which the behavior described is displayed by the child (see rating form for further instructions).
3. The following are elaborated definitions of the behavior to be rated with illustrations.

A. **Self-direction:** Does the child have ideas and plans and does he/she carry them out independently or does he/she need a great deal of direction?

1. Is busy: gets involved in activity right away and is absorbed in what he/she is doing (vs. being idle and needs suggestions). The behavior may, on occasion, be undesirable (e.g., pouring paint on the floor) but if it is clearly "experimental" behavior and not habitual (testing limits) it is scored here.
2. Self-directed: goes about business on own, choosing what he/she wants to do (vs. other-directed, i.e., following teacher's direction or peer's direction, watching others for an idea).
3. Attends or "focused": concentrates, or becomes absorbed in activities or a task (vs. distractable, and usually paying more attention to other events than what he/she is doing).
4. Purposeful and planful:
   Goal-directed: is purposeful (e.g., sets out to construct a garage, complete a puzzle, print his/her name, etc. vs. aimless, manipulates materials at random).
   Planful: makes plans to carry out a project, for example, sets out to make a booklet, or clay model or boat (vs. impetuous or random behavior with no apparent plan such as hammers for fun of hammering, not making anything).
   Carries out plans: sustains a sequence of activities and completes a project or at least completes a series of steps toward that end (vs. capricious, i.e., has a whim, but does not carry out).

B. **Mastery motivation:** How does the child react to challenge, difficulty and frustration (i.e., does the child try hard to succeed or does he/she give up easily? Does the child take time to figure out the situation or does he/she just charge ahead? Does the child "keep his/her head" or does he/she "go to pieces" emotionally?).

1. Tries hard: to learn new skills (e.g., determined to master a puzzle or to ride a tricycle vs. a passive onlooker or little effort).
2. Persistent: tries hard to extricate himself/herself from some difficulty, for example, to move a heavy block, to unhook a wagon from a caught position, to work a zipper (vs. little effort or quickly seeks help), makes a large number of attempts to solve a puzzle or other problem, keeps coming back at it (vs. one or two tries and quickly gives up), includes frustration tolerance in task-oriented behavior.
3. Takes some risks: hazards failure (takes some risks vs. avoids difficulty or chance of failure), hazards consequences, which he/she understands and can predict, if wants to do something very much, and accepts consequences when they follow.
4. Accepts limitations (failures) with equanimity (i.e., when fails to achieve something which is too difficult, gives up, or accepts this vs. severely distressed, hostile or destructive).
5. "Keeps head" emotionally: when facing a frustration remains steady vs. breaks down (cries) or blows up in anger, copes with accidents with control (i.e., handles the situation quietly vs. cries or has violent emotion), accepts consequences if disciplined, accepts it (vs. cries, expresses hostility, blames the situation on someone else, has a temper tantrum).
6. Thoughtful ("reflective"): tends to study a problem, consider well before tackling it, or when up against a difficulty (vs. an impulsive, rapid, direct attack).
7. Resourceful: thinks up varied solutions to problems independently, tries various ways of extricating himself/herself from a difficulty or various ways of solving a problem (vs. keeps doing the same thing over and over even though it does not work).
8. Uses resources (adults, peers, science center, books, etc.) to get information or knowledge which can be used by him/her to carry out plans. This is instrumental use of resources, *not* emotional where he/she seeks comfort or tries to get someone else to do the task for him/her (vs. rushing ahead without attempting to get information required).
9. Applies information (obtained from resources) *independently*. Child may or may not be successful or effective in his/her use

of the information, the important thing is that the child does try to use it (vs. gets information but does not use it).

C. **Self-management** (self-control and responsibility): Does the child cooperate and conform to reasonable limits and requirements? Is he/she using good judgment in doing this or is he/she "submissive" or cowed (i.e., can child risk non-conformity where requirements are unusual or directions unreasonable? Does the child look after his/her personal needs independently?).

1. Conforms to regular limits set by school (vs. needs constant reminders).
2. Cooperates with adults in following reasonable directions or suggestions and requests (vs. refuses or complains).
3. Waits for turn: can postpone satisfaction (i.e., can wait for turn to play with something or wait for juice until it is ready vs. insists on having it now and cries or gets mad).
4. Can carry through a task: carries out jobs (responsibilities) he/she has undertaken to do in a dependable way (e.g., puts out the juice glasses and completes the job vs. wanders off and forgets to do it).
5. Dresses himself/herself: makes serious effort to get clothes on and off without needing more than a minimum of help with special problems like jammed zippers, etc.
6. Washes self: makes serious effort to carry out the washing routine appropriately and usually succeeds without help.
7. Toilet: looks after own toilet needs efficiently and independently.
8. Questions unusual requirements or directions (vs. accepts passively, or is a "model" child), tests limits imposed by a stranger, or does not readily conform. "Has a mind of his/her own" (vs. easily led or highly suggestible).
9. Makes decisions without difficulty (i.e., can make up mind vs. conflicted, uncertain, procrastinating). This item is *not* a measure of impulsivity, for the impulsive child may be avoiding the anxiety of decision-making by seizing on one alternative without thinking about it. Here we are interested in the child's ability to decide on a course of action without excessive vacillation back and forth between alternatives.

D. **Curiosity** (exploration): response to a novel situation, task or toy. How does the child deal with a novel toy or a new situation or a new animal that is brought on the scene? Does the child approach or avoid? Does the child actively examine them and try to find out about them?

1. Stays in the novel situation (vs. withdraws or avoids, such as hiding behind teacher).
2. Approaches new objects and visually explores.
3. Approaches new situations and touches and examines (i.e., manipulates actively and eager to get at them).
4. Asks questions, makes inquiries (vs. makes no verbal efforts to learn).

E. **Creativity:** Is the child creative or does he/she do things as he/she has been taught to do them or as he/she has seen others do them in stereotyped ways?

1. Usually works with flexible materials which he/she uses in a variety of ways for own purposes (vs. peg boards, or highly structured materials which he/she uses in a stereotyped way, OR excessive use of materials such as puzzles which he/she has mastered and can complete without any real effort).
2. Is highly original in use of materials (vs. stereotyped in play). Has novel ideas about how to use the materials and produces original products (i.e., makes something different from the other children vs. imitating a model).
3. Offers novel solutions to problems (i.e., offers an idea of how he/she or someone else can do something or resolve a difficulty vs. no novel ideas or stereotyped ones).
4. Makes interesting or novel association (e.g., when presented with a picture or object or theme child notices a relationship with it and some previous experience he/she has had, e.g., "that looks like a castle" or says, e.g., "this is the simplest work, simple as a bee can fly" OR is creative [original] in expressive movements [dance] or with music, or sculpture or painting [the arts] or makes up new rhymes and songs).

F. **Imagination:** Does this child use "pretend" elements in his/her play or is child completely bound to concrete reality?

1. Uses pretend elements in play (e.g., makes believe that he/she is making a cake using "pretend" materials, using blocks to stand for a car or other objects vs. using materials in realistic ways, i.e., a block is a block).
2. Role plays: acts out being a mother, doctor, policeman, etc. (vs. no play of this type).
3. Role play: highly organized activity such as going to an adult party, dressing up for it and talking about it, or putting on a play (vs. simple doll play activities with low organization).

Appendix B

UWO PRESCHOOL BEHAVIOR RATING SCALE

Non-Social Adaptive Behavior

Name of Child ______________________________ Sex ____
Date ______________________________ Age ____
Rater ______________________________ Grp ____
School ______________________________

INSTRUCTIONS: Rate 0-6 on each item according to the extent to which the behavior described applies to the child. If you have no basis for judgment or are unsure, record D.K. (don't know). For elaborated behavior definitions consult the Manual.

Think in terms of a 6-point scale as follows:

0	1	2	3	4	5	6
Never	Rarely	Sometimes	About as often as not, half the time	Often	Most of the time	Always

	Rating
A. **Self-direction:** Does the child have ideas and plans and does he/she carry them out independently (or does the child need a great deal of direction from others)? 1. Is busy, actively engaged	
2. Is self directed, selects his/her own activities independently	
3. Attends to or concentrates on what he/she is doing	
4. Is purposeful and planful and carries out plans	
Mean Score (self-direction)	
B. **Mastery motivation:** How does the child react to challenge, difficulty and frustration (i.e., does he/she try hard to succeed or does he/she give up easily? Does the child take time to figure out the situation or does he/she just charge ahead? Does	

	Rating
the child "keep his/her head" or does he/she "go to pieces" emotionally)? 1. Tries hard to learn new skills	
2. Persistent (keeps trying) when encounters problems in play activities	
3. Takes some risks: Hazards failure or consequences when wants to do something very much	
4. Accepts limitations with equanimity when something is too difficult	
5. "Keeps head" emotionally when frustrated or in difficulty	
6. Thoughtful: Is reflective or considered in his/her approach to problems	
7. Resourceful: Invents various solutions to a problem	
8. Uses resources in problem solving	
9. Applies information (from resources) independently (may not always be effective)	
Mean Score (mastery motivation)	
C. **Self-management** (self-control and responsibility): Does the child cooperate and conform to reasonable limits and requirements? Is the child using good judgment in doing this or is he/she "submissive" or cowed (i.e., can the child risk non-conformity when requirements are unusual? Does the child look after his/her personal needs independently)? 1. Conforms to limits and requirements of the school	
2. Cooperates with teachers in following directions, suggestions and requests	
3. Waits for turn in a group	
4. Can take on and carry through a simple task like putting out juice cups	

	Rating
5. Dresses self	
6. Washes self	
7. Toilets self	
8. Questions unusual requirements or directions	
9. Makes decisions without difficulty or procrastination	
Mean Score (Self-control)	
D. **Curiosity** (exploration): (response to a novel task *or situation*). How does this child deal with a novel toy or a new animal that is brought on the scene? Does the child approach or avoid? Does the child actively examine them and try to find out about them? Does the child approach or avoid? Try? 1. Stays in a novel situation (i.e., does not avoid)	
2. Approaches new objects and visually explores	
3. Approaches new situations and touches and examines (i.e., manipulates actively and eagerly)	
4. Asks questions, makes inquiries (i.e., makes a verbal effort to learn)	
Mean Score (Curiosity)	
E. **Creativity:** Is the child creative or does he/she do things as he/she has been taught to do them or as he/she has seen others do them in stereotyped ways? 1. Usually works with flexible materials which he/she can use in a variety of ways for his/her own purposes	
2. Is highly original in use of materials (i.e., has novel ideas about how to use the materials and produces original products; makes something different from the other children)	
3. Offers novel solutions to problems (i.e., offers an idea of how he/she or someone else can do something or resolve a difficulty)	

	Rating
4. Is highly original: verbally (novel associations), or music or dance (body movement)	
Mean Score (Creativity)	
F. **Imagination:** Does this child use "pretend" elements in play or is the child completely bound to concrete reality? 1. Uses pretend elements in play (e.g., makes believe that he/she is making a cake using "pretend" materials; uses blocks to stand for a car or other object)	
2. Role plays: acts out being a mother, doctor, policeman, etc. (e.g., simple doll play activity)	
3. Role play: highly organized; activity such as going to an adult party, dressing up for it and talking about it, or putting on a play (must include a sequence of sustained activities)	
Mean Score (Imagination)	

9

Summative Evaluation: The Immediate Impact—Results

Comparison Groups

The preliminary analyses reported in the preceding chapter indicated that ability (Binet IQ) was such a powerful variable in predicting achievement that it must be taken into account in the analyses of the data for compensatory effects. Therefore, for the purpose of studying the immediate impact of the program, four of the ability sub-groups identified in Chapter 8 were treated as main groups. They were: (a) the three ability sub-groups (high-, average-, and low-) in the target group (Group A) of children who were in the program for two years, starting at age three, and (b) the low-income sub-group of children in Group B who were in the program for only one year, starting at age four.

The four groups included a total of 65 subjects. They were as follows:

1. *A/high-ability:* the 26 high-income children in the program for two years (12 boys, 14 girls).
   Mean IQ second year in preschool: *116.7* (*SD* 11.1, range 89.0-133.5).
2. *A/average-ability:* the 12 low-income children in the program for two years with the most ability (5 boys, 7 girls).
   Mean IQ second year in preschool: *106.9* (*SD* 7.2, range 99.5-123).
3. *A/low-ability:* the 12 low-income children in the program for two years with the least ability (6 boys, 6 girls).
   Mean IQ second year in preschool: *89.5* (*SD* 8.35, range 70.5-99.0).

4. *B/average-ability:* the 15 low-income children in the program for only one year (9 boys, 6 girls).
   Mean IQ second year in school (KG, n = 12) *106.3* (*SD* 7.9, range 97.5-124.5).

Note that the ability score for each child was the mean of the two Binet IQ scores that the child obtained in his or her *second* year in an early education program.

Presentation of Results

This chapter has four sections. In the first three, changes in the performance of the groups, in each of the three major areas in which they were assessed, are described. Section 1 deals with their intellectual and cognitive abilities as measured by the Binet, Preschool Inventory, Circus "Say and Tell" and Circus "How Much and How Many"; Section 2 deals with their problem-solving styles and strategies as measured by Circus "Think It Through" and Circus "Make a Tree," The Kansas Reflection-Impulsivity Scale, and teacher ratings of Self-Direction, Mastery Motivation, Self-Management, Curiosity, Creativity, Imagination; and Section 3 deals with their social competence as measured by the Peer Interaction, Quality-Effectiveness Score (PI,Q-ES). A summary of the results is provided at the end of each of these sections. In Section 4 all of the results are discussed.

In reporting the findings for each measure, the results for the "A" groups are presented first and considered separately. The results obtained with the "B" group are then presented and compared with those obtained with the "A" groups.

Changes in the mean scores of the groups are shown graphically so that the extent to which the gaps between the high-income (high-ability) and the low-income groups (A/average-, A/low- and B/average-ability) decreased, remained constant or increased over time may be seen at a glance. However, tables providing full details of the results, including the number of subjects on which each Mean was based and its standard deviation are appended.

In the graphs, the lines showing the changes in the mean scores of the "A" groups from the end of the first to the beginning of the second year are, in some cases, not joined. This occurs when these means are not directly comparable because the number of subjects who took the test in the first year was different from the number who took it in the second year. As explained in the preceding chapter, the Binet and Circus tests were not given in the first year of the project, the former because the teachers resisted its use and the latter because they had not been published. Therefore, these tests were not given to the subjects in the first cohort during their first preschool year.

Data Analysis Procedures

Analysis of variance procedures were used to assess the significance of the changes in the differences among the groups that occurred over time and, when significant effects were found, post-hoc analyses of the differences among the mean scores of the groups were done using *t* tests.

The data were analyzed in two stages. First, the data obtained with the three "A" groups were analyzed separately by submitting them to a series of 3(Ability Group) x 2(Year: first, second) x 2(Time: spring, fall) x 2(Sex) ANOVAs. However, in these, only the subjects who were tested in both their first and second preschool years could be included and, therefore, in the analyses of the Binet and Circus test data the number of subjects in each sample was reduced (see Tables A-1 and A-3 through A-6 in Appendix A). Second, the data obtained with the three "A" groups in their second preschool year (when all subjects were given all of the tests) and the data obtained with the "B" group in its first preschool year, were subjected to a series of 4(Ability Group) x 2(Time: fall, spring) x 2(Sex) ANOVAs. Note that the "B" group was the same age as the three "A" groups when the data included in these analyses were obtained.

SECTION 1:
INTELLECTUAL AND COGNITIVE ABILITIES

Binet IQ

The "A" Groups

All three ability groups made significant IQ gains and their scores were higher in their second than in their first preschool year (main effect of Year $F[1,33] = 11.6, p < .01$).

In both the first and second year the low-ability group gained more IQ points than did either the high-ability or the average-ability group (Group x Time interactions: $F[1,33] = 11.6, p < .01$; $F[2,47] = 3.4, p < .05$ for the first and second years respectively). However, in the second year this was the result of a loss of some of the gains made by the low-ability group during the summer holidays, which was regained in the second year along with some additional gains. The high- and average-ability groups both made somewhat greater gains in their first than in their second preschool year, but maintained their first-year gains over the summer months and carried them into their second preschool year.

These results are shown in Figure 1 and reported in Table A-1 in Appendix A.

There were wide individual differences in the size of the gains made over the two years by the children in all three groups. Of those tested in both their first and second years, significant gains (i.e., *more* than 6 IQ points) were made by 50% of the high-ability group (range 8-25 points), 71% of the average-ability group (range 10-24 points) and 75% of the low-ability group (range 14-28 points).

The mean gains of the high-, average- and low-ability groups were 8.1 (*SD* 9.0), 11.0 (*SD* 10.9) and 16.0 (*SD* 9.5) IQ points respectively. Thus, over time the general trend was toward a reduction in the size of the differences between the high-income and the low-income groups, suggesting compensatory effects of the program for the latter. The substantial IQ gain made by the high-income (high-ability) group was not expected and it suggests that the program was compensatory even for some of the children in this more advantaged group. In part, because of the gain made by the high-ability group the IQ differences between it and the two low-income groups (average- and low-ability) continued to be large and significant at each test time in each year. (Main effects of Group: $F[2,33] = 27.3, p < .001$; $F[2,47] = 32.5, p < .001$, in the first and second years respectively.)

Finally, of the 16 low-income subjects who were tested in their first preschool year, 56.3% had initial IQs of below 90 and only 18.8% had IQs of 100 or more. In contrast, at the end of their two years in preschool (final score) of the 24 low-income subjects, only 16.7% still had IQs below 90 and 66.7% had IQs of 100 or more.

The B/Average-Ability Group

The initial (fall) mean IQ of this group was significantly lower than that of the A/average-ability group ($t[24] = 2.69, p < .01$), but higher than that of the A/low-ability group ($t[24] = -2.82, p < .01$). However, during the year (B's first and the A groups' second preschool year) the B/average-ability group gained more than the A/average-ability group, but less than the A/low-ability group (Group x Time interaction $F[3,56] = 3.14, p < .05$). As a result, in the spring, the mean IQ of the B/average group fell, as it had in the fall, mid-way between the mean scores of the two "A" low-income groups, but at this time was not significantly different from either of them. However, in the spring the A/average-ability group was still scoring significantly higher than the A/low-ability group ($t[22] = 2.97, p < .01$).

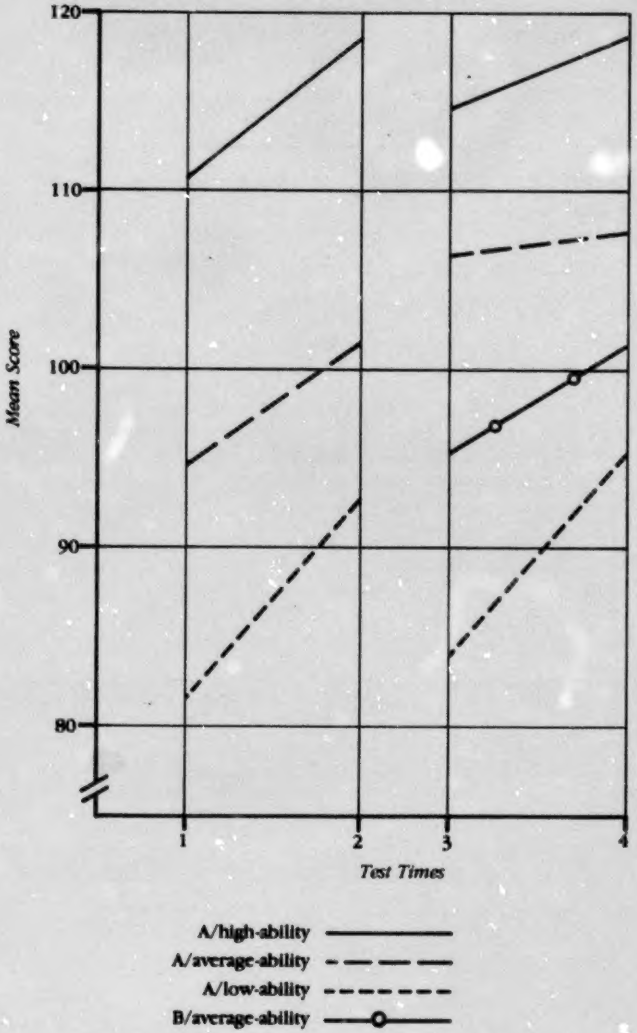


Figure 1

Changes in the Mean Binet IQ
Over Time by Ability Group

Relative to the A/high-ability (high-income) group, the scores of the B/average-ability group were significantly lower at both the fall ($t[38] = 5.11, p < .001$) and the spring ($t[39] = 4.64, p < .001$) test times.

These results, for the "B" group are presented along with those for the "A" groups in Figure 1 and are also reported in Table A-1 in Appendix A.

The mean IQ gain of the B/average-ability group in its first preschool year at age four (5.9 points) was just about the same as the mean gain made by the A/average-ability group in its first preschool year at age three (6.7 points).

Preschool Inventory

The "A" Groups

All three of these groups made highly significant gains over time on this test and their mean scores were higher in their second than in their first preschool year (main effect of Year on *Total* raw score $F[1,44] = 708.3, p < .0000$). Averaging over time, the high-ability group scored higher than the average-ability group and both of these groups scored higher than the low-ability group (main effect of Group on *Total* raw score $F[2,44] = 35.3, p < .0000$). However, over time the size of the differences between the high-ability (high-income) group and each of the two low-income groups (average- and low-) was substantially reduced. These results are shown in Figure 2 (and in Table A-2 in Appendix A).

High-ability vs. average-ability. The differences between these groups were initially very large, but they rapidly decreased over time. The significance of the difference between their mean Total (raw) scores, at each test time (first to fourth), was $t(36) = 4.55, p < .000$; $t(36) = 4.16, p < .000$; $t(36) = 3.81, p < .001$); $t(36) = 2.13, p < .05$, respectively. When the mean percentile scores of these two groups were calculated and compared there was no significant difference between them at the fourth test time.

On the sub-tests, changes in the differences between their mean scores were as follows:

1. *Personal-Social:* The high-ability group scored higher than the average group at the first ($p < .000$), second, ($p < .001$) and third ($p < .000$), but *not* at the fourth test time.
2. *Associative Vocabulary:* The high-ability group scored higher than the average group at the first ($p < .05$) and second ($p < .05$), but *not* at the third and fourth test times.

3. *Concept Numerical:* The high-ability group scored higher than the average group at the first ($p < .001$), second ($p < .001$), third ($p < .01$) and fourth ($p < .05$) test times, but the size of the difference between them progressively decreased.
4. *Concept Sensory:* The high-ability group scored higher than the average group at the first ($p < .001$), second ($p < .001$) and third ($p < .05$), but *not* at the fourth test time.
5. *Don't Know Score:* The high-ability group scored *lower* than the average group at the first ($p < .001$), but not at the second, third or fourth test times.

Thus there was a marked and significant decrease in the size of the differences between these groups. At the fourth test time this may have been, in part, due to ceiling effects on the test for the high-ability group. None of the high-ability subjects obtained the maximum score of 64, but 31% of them obtained scores of 60 or more. However, at the first three test times their scores fell well below 60 suggesting that no ceiling effects were operating at those times.

Average-ability vs. low-ability. The differences between these two groups increased over time (i.e., as the average-ability, low-income children began to perform more like the high-ability, high-income children they became less like their low-ability, low-income counterparts). There was no significant difference between the mean Total (raw) scores of these two groups at the first test time, but the significance of the differences which appeared at the next three test times progressively increased ($t\,[22] = 2.36, p < .05, t\,[22] = 2.69, p < .05; t\,[22] = 3.30, p < .01$; at the second, third and fourth test times respectively). When the mean percentile scores of these two groups were calculated and compared, the difference betwen them was significant at the $p < .01$ level at each of the last three test times.

On the sub-tests, changes in the differences between their mean scores were as follows:

1. *Personal-Social:* There was no difference at the first test time, but the average group scored higher than the low group at the second ($p < .05$), third ($p < .01$) and fourth ($p < .01$) test times.
2. *Associative Vocabulary:* There was no significant difference between these groups at any of the four test times.
3. *Concept Numerical:* There was no significant difference between these groups at the first two test times, but the average group scored higher than the low group at the third ($p < .05$) and fourth ($p < .01$) test times.
4. *Concept Sensory:* The average group scored higher than the low group at the first ($p < .05$), second ($p < .01$), third ($p < .05$) and fourth ($p < .05$) test times.

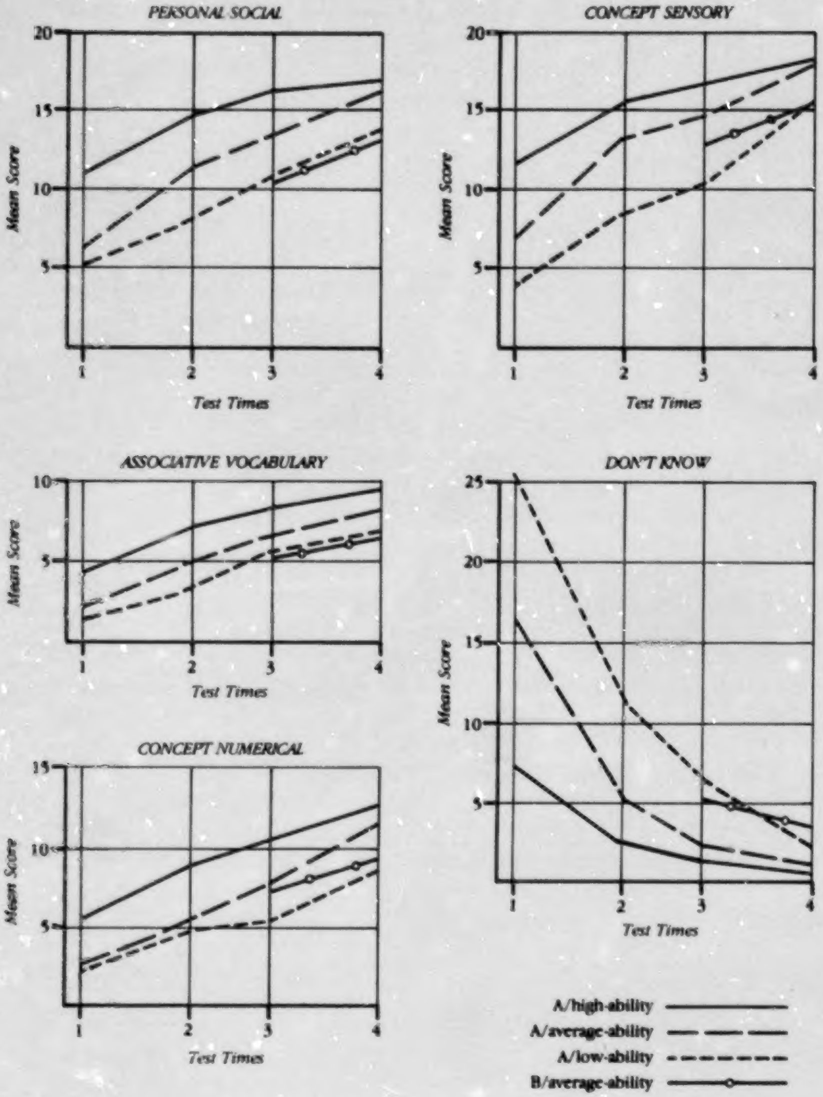


Figure 2

Changes in the Mean Preschool Inventory Scores Over Time by Ability Group

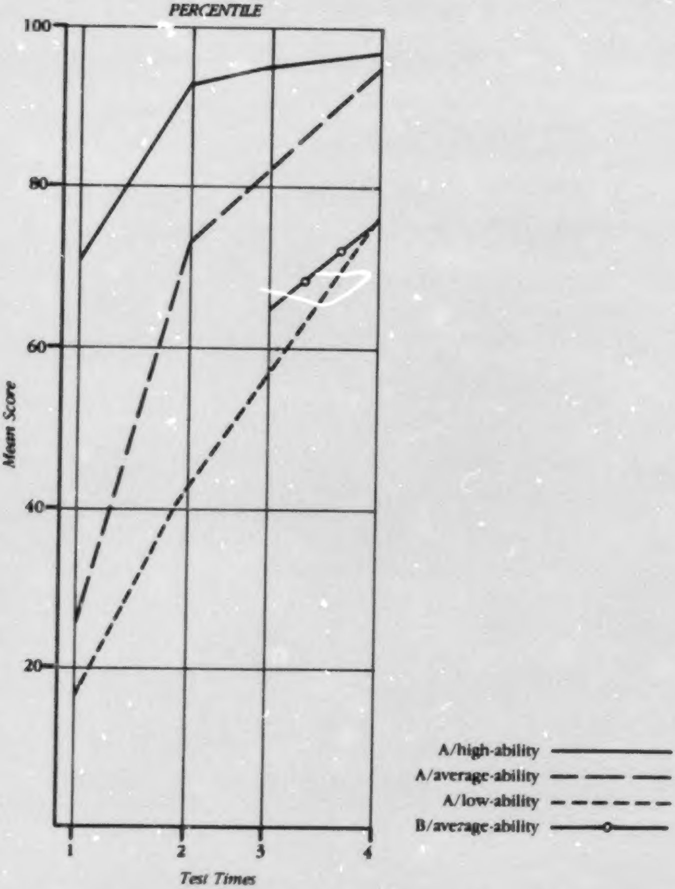


Figure 2

Continued

5. *Don't Know Score:* There was no significant difference between these two groups at any of the four test times.

As judged against American (U.S.) normative data, (see note on Table A-2 in Appendix A at the end of this chapter) the high-ability (high-income group) scored above average at every test time. The average-ability (low-income) group began scoring at an above-average level at the second test time and the low-ability (low-income) group scored at an average level at the third test time and at an above-average level at the fourth test time.

Finally, it is noteworthy that the sub-test on which the smallest socio-economic differences were found was Associative Vocabulary, a measure of language ability.

The B/Average-Ability Group

The initial (fall) scores of this group fell, for the most part, between those of the A/average- and A/low-ability groups. They were consistently lower than the A/average group on all of the sub-tests and the Total (raw) score, but significantly lower on only one sub-test (Personal-Social, $t\,[25] = 2.12$, $p < .05$). They were sometimes slightly lower and sometimes slightly higher than those of the A/low-ability group, but none of the differences between the B/average and A/low groups were large enough to be significant.

During the year, however, the two "A" groups (both average and low) made greater gains than B/average (Group x Time interaction $F\,[3{,}57] = 4.18$, $p < .01$). Thus, in the spring, A/average scored higher than B/average on Personal-Social ($t\,[25] = 2.84$, $p < .01$), Concept Numerical ($t\,[25] = 2.14$, $p < .05$), Concept Sensory ($t\,[25] = 3.26$; $p < .01$), the Total (raw) score ($t\,[25] = 3.12$; $p < .01$) and the percentile score ($t\,[25] = 3.09$, $p < .01$) and the spring scores of B/average and A/low were more alike than their fall scores.

At the end of its one year in preschool, the B/average group was still achieving at a significantly lower level than the A/high-ability (high-income) group (total raw score; $t\,[39] = 5.36$, $p < .01$; Percentile score: $t\,[39] = 5.13$, $p < .001$). This contrasts sharply with the A/average group which, at the end of its second preschool year, was achieving, as was reported above, at a percentile score level which was not significantly different from that of the A/high-ability (high-income) group.

Note that at entrance into preschool (B/average at age 4, and the "A" groups at age 3) the mean percentile scores of the three low-income groups were 64.9 (*SD* 29.8) 25.8 (*SD* 28.5) and 16.0 (*SD* 25.7) for B/average, A/average and A/low respectively, suggesting that the B/average group was less disadvantaged with respect to home-based stimulation than were the two "A" low-income groups.

The results for the B/average group are shown along with those for the three "A" groups in Figure 2 and are reported in Table A-2 in Appendix A.

Circus "Say and Tell," Form A (Productive Language)

The "A" Groups

All three ability groups made significant gains over time on the language abilities assessed by this test and their scores were higher in the second than the first year (main effects of Year were: for Description $F[1,30] = 110.5$, $p < .000$; for Functional Language $F[1,30] = 218.7$, $p < .000$; and for Quality of Narration $F[1,30] = 4.7$, $p < .05$).

On all three sections of the test the high-ability (high-income) group scored significantly higher than the average- and low-ability (low-income) groups, but the differences were greatest on Description (main effect of Group $F[2,30] = 18.1$, $p < .000$) and Functional Language (main effect of Group $F[2,30] = 18.1$, $p < .000$), and least on Narration (main effect of Group $F[2,30] = 4.86$, $p < .05$).

On Description there was no significant reduction in the size of the differences between the high-income and the two low-income groups over time. Although at the first test time there was no significant difference between the scores of the high- and average- groups, the high-ability group scored higher than the average-ability group at the second ($p < .000$), third ($p < .01$) and fourth ($p < .001$) test times. There was no significant difference between the means of the average- and low-ability groups at any of the four test times and the high-ability group scored higher than the low-ability group at every test time.

On Functional Language the size of the initial differences between the high-ability (high-income) and the two low-income groups, especially the average-ability group, were reduced over time. The significance of the difference between the means of the high and the average group was $p < .001$ at the first, second and third test times, but only $p < .05$ at the fourth test time.

The average-ability group performed at a somewhat higher level than the low-ability group, but not at a significantly higher level except at the third test time ($p < .05$).

On Narration there was no significant difference between the scores of the high- and average-ability groups at any test time, but the high-ability group scored higher than the low-ability group at the second ($p < .05$) and third ($p < .01$), but not at the first or fourth test times.

The results for Functional Language are shown graphically in Figure 3. The mean scores of the groups on all sections of the test are presented in Table A-3 in the appendix.

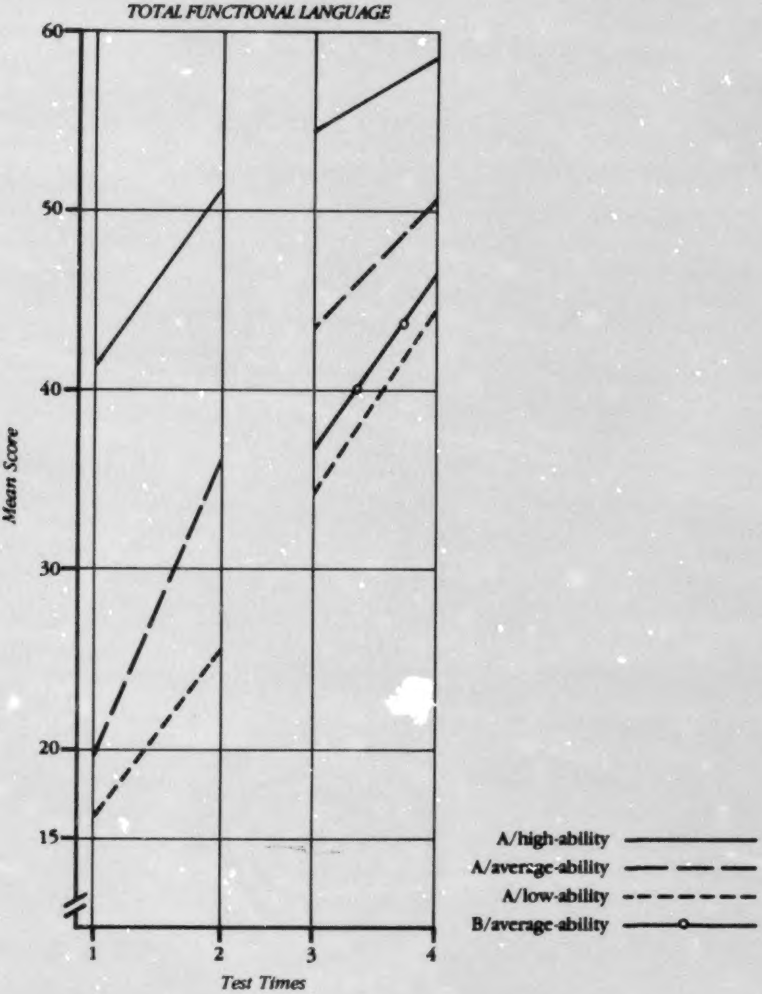


Figure 3

Changes in the Mean Circus "Say and Tell" Functional Language Scores Over Time by Ability Group

When judged against American (U.S.) normative data (see note on Table A-3) on Description, by the last test time the high-ability (high-income) group, but not the average- and low-ability (low-income) groups, was performing at an average level. On Functional Language, the high-ability group began scoring at an above-average level at the second test time and the average-ability, but not the low-ability group, was scoring at a slightly above-average level at the fourth test time. On Narration both the high-ability (high-income) and the average-ability (low-income) group scored average or above average on all three measures of Narration at all four test times. The low-ability (low-income) group scored below average on Narration at the first three test times, but average or above average at the fourth test time.

Thus, relatively large socio-economic differences were found on this test and, although they were reduced over time on Functional Language and Narration, they remained about the same (no increase or decrease) on Description.

The B/Average-Ability Group

The initial (fall) scores of this group fell between those of the two "A" low-income groups (i.e., lower than A/average- and higher than A/low-) on Functional Language and Narration, and below the scores of both of the "A" low-income groups on Description. However, none of the differences among them was large enough to be significant. Also at the spring test time there were still no significant differences among the scores of these three low-income groups. However, relative to the A/high-ability (high-income) group, at the spring test time, A/average was performing better than B/average on Functional Language. At this time the difference between the A/high- and the B/average-ability groups was still highly significant (t [38] = 3.45, $p < .001$), but the difference between the A/high- and the A/average-ability groups had been substantially reduced (t [36] = 3.11, $p < .05$).

The results for the B/average-ability group on Functional Language are shown in Figure 3 along with those for the three "A" groups and are reported in Table A-3 in the appendix.

It is noteworthy that the B/average-ability group had, like the two "A" low-income groups, more difficulty with Description than with the other two sections of this test and was still (like the "A" low-income groups) scoring below average on Description at the spring test time. On Functional Language, the B/average group improved, but (unlike the A/average group) again scored below average at the spring test time. On Narration the B/average group, like the two "A" low-income groups, performed fairly satisfactorily and at the spring test time scored at an average level.

Circus "How Much and How Many"

The "A" Groups

All three ability groups made significant gains on this test and their scores were higher in their second than in their first preschool year (main effect for Year $F[1,30] = 123.9, p < .000$).

Averaging over time the high-ability group scored higher than the average group and the average group scored higher than the low-ability group (main effect of Ability Group: $F[2,30] = 15.2, p < .000$), but the differences among the groups changed over time and were not the same in their second as in their first preschool year.

High-ability vs. average-ability. At the first test time there was no significant difference between the mean total scores of these two groups, but at the second test time the high-ability group scored higher than the average-ability group ($t[25] = 2.73, p < .01$). At the third test time the size of the difference between them had decreased, but the high-ability group again scored higher than the average group ($t[36] = 2.56, p < .05$). At the fourth test time there was no significant difference between the mean total scores of these two groups. On the sub-tests the differences between them changed as follows:

1. *Counting:* No significant difference at the first two test times. The high-ability group scored higher than the average group at the third time ($p < .05$); no significant difference at the fourth time.
2. *Relational Terms:* No significant difference at the first test time; the high-ability group scored higher than the average group at the second ($p < .05$) and third ($p < .05$) times; no significant difference at the fourth test time.
3. *Numerical Concepts:* No significant difference at the first test time; the high-ability group scored higher than the average group at the second ($p < .05$) time; no significant differences at the third and fourth test times.

Thus, the differences between these groups increased during their first preschool year, but decreased in their second preschool year.

Average-ability vs. low-ability. On the total score, the average-ability group scored higher than the low group at all but the second test time and the size of the difference between these two groups increased over time ($t[14] = 2.77, p < .05$; $t[22] = 2.44, p < .05$; $t[22] = 2.82, p < .01$ at the first, third and fourth test times respectively). On the sub-test scores the differences between them changed as follows:

1. *Counting:* No significant difference at the first three test times; the average-ability group scored higher than the low group at the fourth ($p < .05$) time.

2. *Relational Terms:* No significant difference at the first two test times; the average-ability group scored higher than the low group at the third ($p < .05$) and the fourth ($p < .05$) test times.
3. *Numerical Concepts:* The average-ability group scored higher than the low group at the first test time ($p < .01$), but not at the last three test times.

These findings are shown in Figure 4 and are reported in Table A-4 in the appendix.

These findings are of particular interest because the changes that occurred between the high- and average-ability groups in the first year were the kind that were expected if the groups differed widely in ability, but did *not* differ in previous opportunities for learning. Perhaps at the beginning of preschool the high-ability group had received no more "teaching" about number than the average-ability group and therefore performed no better. However, when given equal opportunities to learn, the high-ability group did so more rapidly than the average-ability group, at least in the first preschool year. The gains of the average-ability group in the second preschool year, which were greater than those of the high-ability group, are therefore particularly remarkable.

Thus, over time the differences between the high-ability, high-income group and the average-ability, low-income group were reduced. The differences between the high-ability group and the low-ability group were not reduced, but the low-ability group gained as much as the high-ability group and the differences between them did not increase.

When judged against American (U.S.) normative data (see no[illegible] on Table A-4 in the appendix), the high-ability (high-income) group began performing at an above-average level at the third test time and the average-ability (low-income) group was performing at an above-average level at the fourth test time. However, the low-ability (low-income) group was still scoring below average at the fourth test time.

The B/Average-Ability Group

The initial (fall) scores of this group fell between those of the two "A" low-income groups, consistently lower, although not significantly lower than those of the A/average group and slightly higher or about the same as those of the A/low group. However, during the year, the A/average group gained more than the B/average group and in the spring the differences between them were significant (total score $t[24] = 2.18$, $p < .05$).

At the end of its one year in preschool, B/average was still scoring below average and at a significantly lower level than the A/high-ability, high-income group on this test and all of its sub-tests (total raw score $t[38] = 4.60$, $p < .001$). This contrasts sharply with the A/average group

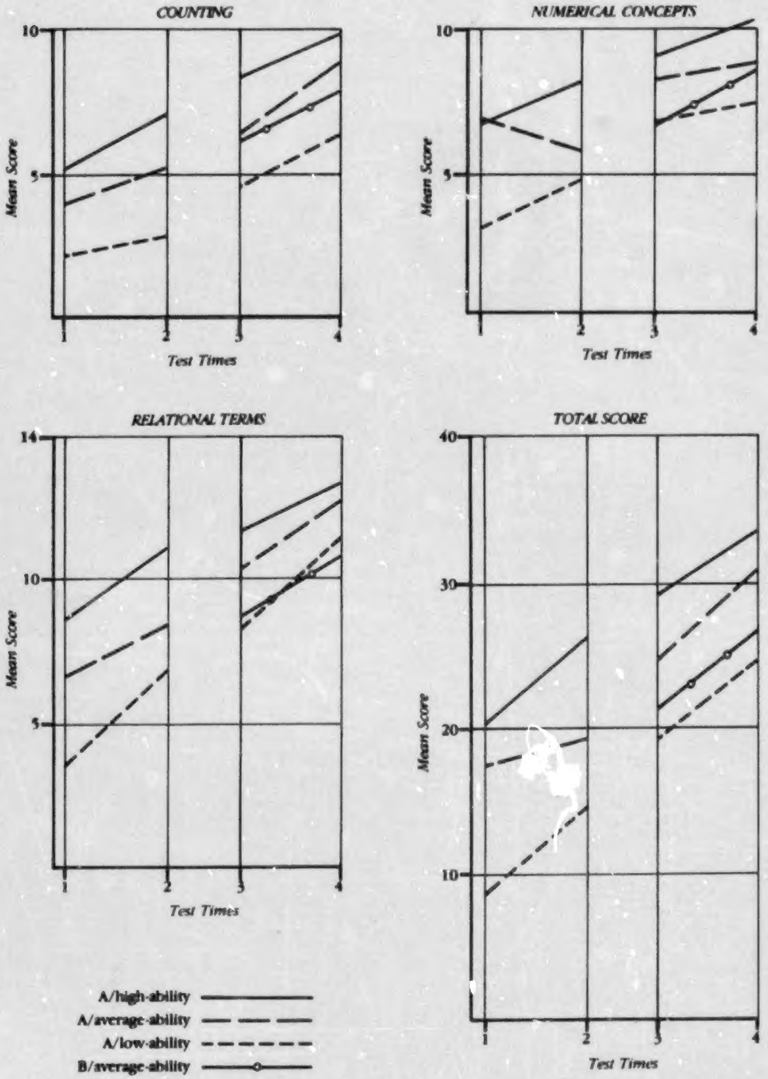


Figure 4

Changes in the Mean Circus "How Much and How Many" Scores Over Time by Ability Group which, at the end of its second preschool year, was performing at a better than average level, not significantly different from the A/high-ability (high-income) group.

Summary: Intellectual and Cognitive Abilities

The study of changes in the size of the differences among the three "A" groups: the high-income (high-ability) and the two low-income groups (average-ability and low-ability) over two years in the preschool yielded the following results:

1. All three ability groups made significant gains over time on all of the measures.
2. Socio-economic status and ability (Binet IQ) were highly significant predictors of performance on all of the measures of cognitive ability. When the scores were averaged over time the high-ability (high-income) group obtained the highest scores, the average-ability (low-income) group obtained the next highest scores and the low-ability (low-income) group obtained the lowest scores. However, over the two years in preschool, the differences between the high-income and each of the two low-income groups decreased on most measures and did not increase on any measure.
3. *The average-ability, low-income group* made the more impressive gains because this group essentially "caught-up" to the high-ability, high-income group on two of the tests (the Preschool Inventory and Circus "How Much and How Many"). The average-ability group made greater gains than the high-ability group on all of the measures, except the Description and Narration sections of Circus "Say and Tell" on which the gains made were about the same as those made by the high-ability group.
4. *The low-ability, low-income group* also made impressive gains considering this group's apparent limitations with respect to IQ, but it did not "catch up" to the high-ability, high-income group on any of the measures. It did, however, make greater gains than the high-income group on the Binet, the Preschool Inventory and one part of Circus "Say and Tell" (Functional Language) and reduced the size of the differences between them. On the other measures (Circus "How Much and How Many" and the Description and Narration sections of Circus "Say and Tell") this group made gains equivalent to those of the high-income group and the differences between them did not increase.
5. *The ability (IQ) difference between the two low-income groups* was an important determinant of their response to the program. The initial differences between the average-ability and the low-ability

groups on all of the tests, except the Binet, were small and insignificant, but differences soon began to emerge and these increased over time. Thus, as the average-ability group began to perform more and more like the high-ability group, it performed less and less like the low-ability, low-income group.

6. *On IQ*, the impact of the program was greater on the low-ability than on either the average-ability or the high-ability groups, but all three groups made significant IQ gains with as many as half of even the high-ability group increasing their IQ scores by more than six IQ points.
7. *On Language* the findings were inconsistent. The socio-economic and ability differences on the Associative Vocabulary section of the Preschool Inventory and the Narration section of Circus "Say and Tell" were small and generally insignificant. However, on "Say and Tell" Description and Functional Language, large initial socio-economic and ability differences were found and although on Functional Language these were reduced over time, on Description they were not (i.e., they persisted to the end of the children's second preschool year).

The study of the changes in the size of the differences between the "B" low-income, average-ability group without previous preschool experience, and the two "A" low-income groups with a year of previous preschool experience, over one year in preschool when all subjects were four- to five-year-olds, yielded the following results:

1. The initial (fall) scores of the B/average-ability group were consistently lower than those of the A/average-ability group on all four tests, but significantly lower on only the Binet and one subtest of the Preschool Inventory. Typically the scores of the B/average group fell between those of the A/average- and A/low-ability groups. They were usually slightly higher, but not significantly higher, except on the Binet, than those of the A/low-ability group.
2. The A/average-ability group (in its second preschool year) made greater gains than the B/average-ability group (in its first preschool year) on the Preschool Inventory, Circus "How Much and How Many" and the Functional Language section of Circus "Say and Tell" and by the end of the year was performing at a level which was significantly higher than the B/average-ability group. When compared with the scores of the A/high-ability, high-income group at the spring assessment time, the differences between the B/average- and A/high-ability groups were still highly significant, but the differences between the A/average- and the A/high-ability groups were either no longer significant (Preschool Inventory and

Circus "How Much and How Many") or were substantially reduced (Functional Language). The B/average group did, however, make greater IQ gains than the A/average group during this year and in the spring there was no significant difference between them on the Binet.

3. The A/low-ability group (in its second preschool year) also made greater gains than the B/average-ability group (in its first preschool year) on the Preschool Inventory and the Binet (but not on the other two measures). At the spring test time there were no significant differences between the B/average- and the A/low-ability groups on any of the four measures.

SECTION 2: PROBLEM-SOLVING AND COGNITIVE STYLES

Circus "Think It Through" (Problem-Solving)

The "A" Groups

All three ability groups made significant gains over time on this test and their mean total scores were higher in their second than in their first preschool year (main effect of Year $F[1,30] = 186.6$, $p < .000$).

There was a main effect of Ability Group on the total score ($F[2,30] = 14.4$, $p < .0001$). The scores of the high- and average-ability groups were not significantly different at the first two test times but the high-ability group scored higher than the average group at the third ($t[36] = 2.09$, $p < .05$) and fourth ($t[36] = 2.04$, $p < .05$) test times. There were no significant differences between these groups on two of the three sub-tests at any test time, but the high-ability group scored higher than the average group ($p < .05$) on Classification at the third and fourth test times.

The total scores of the low-ability group were consistently and significantly lower than those of the high-ability group at every test time. They were also lower than the scores of the average-ability group at the first, second and third test times ($t[14] = 2.85$, $p < .05$; $t[14] = 2.46$, $p < .05$; $t[22] = 2.25$, $p < .05$ respectively) but not at the fourth time. However, the low-ability group gained more in its second preschool year than did either the high- or the average-ability group (Group x Time interaction $F[3,56] = 2.9$, $p < .05$).

These results are presented in Figure 5 and in Table A-5 in the appendix.

Judged against American (U.S.) national means (see note on Table A-5 in the appendix), by the fourth test time only the high-ability group was performing at an average level for preschool-aged children.

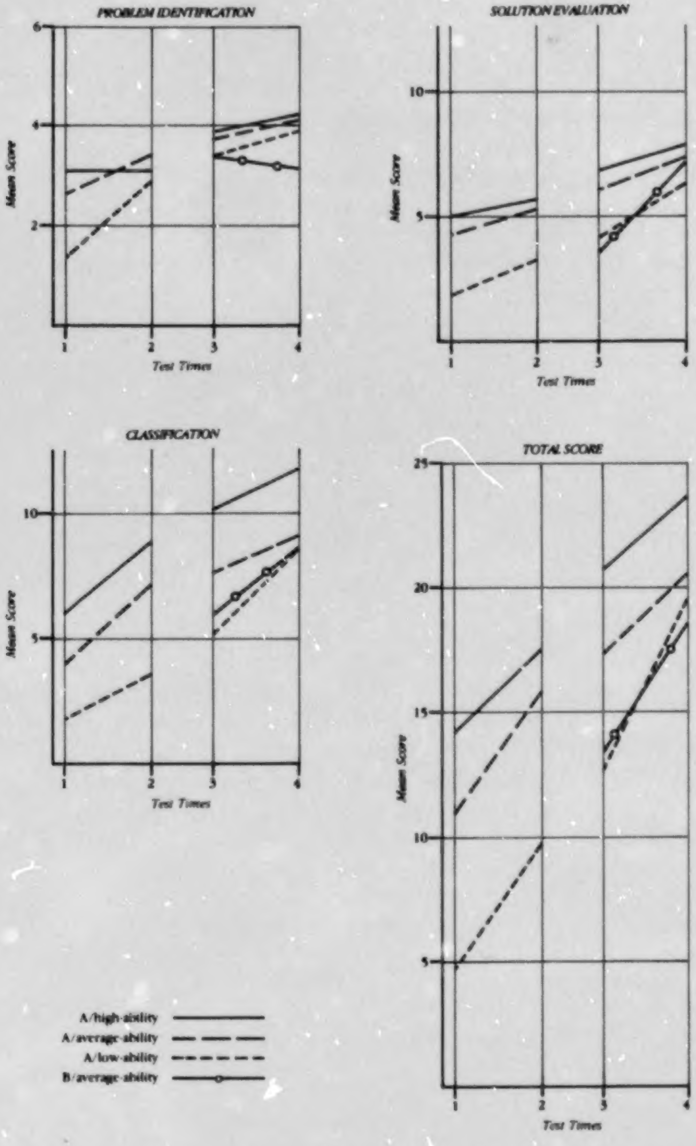


Figure 5

Changes in the Mean Circus "Think It Through" Scores Over Time by Ability Group

The B/Average-Ability Group

The initial (fall) scores of the B/average-ability group were lower than those of the A/average-ability group (total score: $t\,[24] = 2.44$, $p < .05$) and almost exactly the same as those of the A/low-ability group. During the year, the B/average group (like the A/low group) gained somewhat more than the A/average group and reduced the size of the difference between them. However, in the spring, relative to the A/high-ability (high-income) group, the A/average group was still performing at a higher level than the B/average group. On total score the difference between the A/high- and the A/average-ability group was significant ($t\,[36] = 2.04$, $p < .05$) but not at as high a level as was the difference between the A/high- and B/average-ability groups ($t\,[38] = 3.20$, $p < .01$).

At the spring test time, the B/average-ability group was still scoring (as were the two "A" low-income groups) at a below-average level, as judged against American norms.

The results for the B/average-ability group are shown along with those for the three "A" groups in Figure 5 and are reported in Table A-5 in the appendix.

Circus "Make a Tree" (Creativity)

The "A" Groups

All three ability groups made significant gains over time and their scores were higher in their second than in their first preschool year (main effect of Year: on Appropriateness $F\,[1{,}30] = 27.3$, $p < .0000$; on Unusualness $F\,[1{,}30] = 16.7$, $p < .0001$; on Difference $F\,[1{,}30] = 8.5$, $p < .001$).

The differences among the groups on this measure were relatively small and no main effects of Ability Group were found. The high- and average-ability groups improved at about the same rate and there was no significant difference between them at any of the four test times. The differences between the high- and the low-ability groups did, however, increase over time on two of the three dimensions measured and, at the last test time, the high-ability group scored higher than the low-ability group on Appropriateness ($t\,[36] = -2.84$, $p < .01$) and Unusualness ($t\,[36] = -2.70$, $p < .01$).

When judged against American norms, the high- and average-ability groups, but not the low-ability group, were performing at an average level for preschool-aged children at the third and fourth test times.

These results are shown in Figure 6 and are reported in Table A-6 in the appendix.

The B/Average-Ability Group

The initial (fall) scores of the B/average-ability group were somewhat lower on all three dimensions measured by this test than those of the A/average-ability group, and significantly lower on one of them (Appropriateness: *t* [18] = 2.15, $p < .05$). On Appropriateness, the B/average group also scored somewhat, though not significantly, lower than the A/low-ability group. However, on the Appropriateness dimension, the B/average group made greater gains from fall to spring than the A/average group and also the A/high group (Group x Time interaction *F* [3,50] = 3.76, $p < .05$). At the spring test time there were no significant differences between the two average-ability groups (A and B) or between them and the A/high-ability group on any of the three dimensions.

These findings for the B/average-ability group are shown along with the results for the three "A" groups in Figure 6, and are reported in Table A-6 in the appendix.

The Kansas Reflection-Impulsivity Scale for Preschoolers (KRISP)

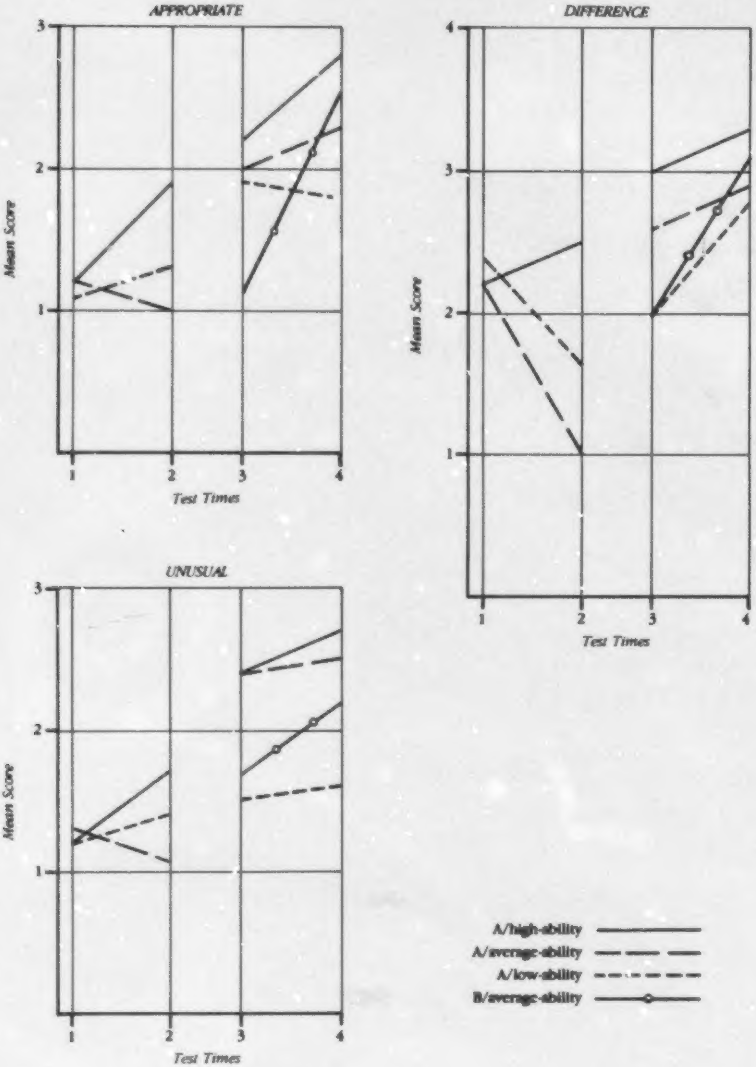
The "A" Groups

On this measure all three ability groups reduced their error scores over time and made significantly fewer errors in their second than in their first preschool year (main effect of Year *F* [1,25] = 50.1, $p < .00000$).

The Error scores of the high-ability and average-ability groups were not significantly different at any of the four test times and these groups improved at the same rate. However, at every test time except the first, the low-ability group made more errors ($p < .01$) than either the high- or the average-ability groups. The Latency scores on this measure did not differentiate the three groups at any of the four test times.

The results for the Error scores are shown graphically in Figure 7 and the results for Latency as well as Errors are presented in Table A-7 in the appendix.

On reflection-impulsivity, as measured by this test, there was little difference, at any test time, between the high- and the average-ability groups. Although some of the high-ability subjects and none of the average-ability subjects were reflective at each test time, more of the average-ability group were "average," or "fast accurate" each time, and this type of performance is considered satisfactory. Furthermore, there was little difference between these two groups in the frequency with which the children were impulsive. However, more of the low-ability subjects than the high- or average-ability subjects were impulsive at each



APPROPRIATE

DIFFERENCE

UNUSUAL

Figure 6

Changes in the Mean Circus "Make a Tree" Scores by Ability Group

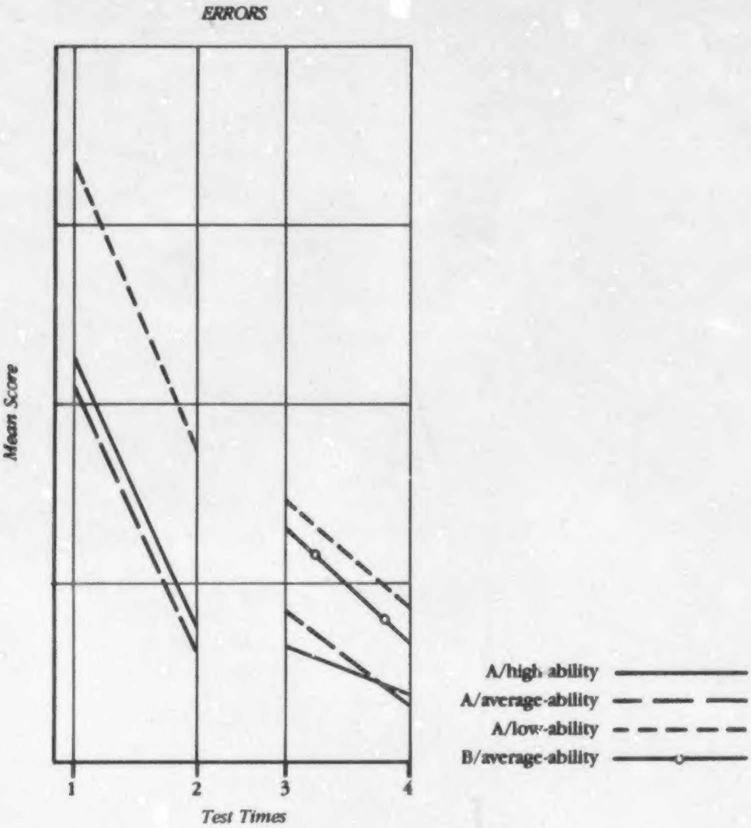


Figure 7

Changes in the Mean KRISP Error Scores by Ability Group

assessment time. As many as half of them at the third test time and one third of them at the fourth test time were still impulsive. These findings are reported in Table A-8 in the appendix.

The B/Average-Ability Group

Both the initial and final error scores of this group fell between those of the two "A" low-income groups, somewhat higher, but not significantly higher than the A/average group and somewhat lower, but not significantly lower than the A/low-ability group. However, the B/average group (unlike A/average) made more errors than the high-ability group at both the fall and spring test times ($t[37] = -2.81, p < .01$ and $t[34] = -1.93, p < .05$ respectively).

The Latency scores of the "B" group were not significantly different from those of any of the three "A" groups.

These results for the "B" group are shown along with those for the "A" groups in Figure 7.

On reflection-impulsivity there was little difference between the B/average group and A/high or between the B/average group and A/average, and the subjects in B/average were less often impulsive than were the subjects in the A/low group (see Table A-8 in the appendix).

Teacher Ratings

The "A" Groups

1. *Self-Direction.* All three ability groups made significant gains over time and their ratings were higher in their second than in their first preschool year (main effect of Year $F[1,44] = 48.5, p < .0000$).

   There was a main effect of Ability Group ($F[2,44] = 3.29, p < .05$), but it was relatively small and there was no significant difference between the high- and average-ability groups at any of the assessment times. Furthermore the high-ability group scored higher than the low-ability group at only one time (the third: $t[36] = -2.61, p < .05$) and the average-ability group scored higher than the low-ability group at only one time (the second: $t[22] = 2.86, p < .01$). At the fourth assessment time there were no significant differences among the three ability groups.
2. *Mastery Motivation.* All three ability groups made significant gains over time and their scores were higher in their second than in their first preschool year (main effect of Year $F[1,44] = 102.4, p < .0000$). The gains made were greater in the first than the second year (Year x Time interaction $F[1,44] = 9.5, p < .01$).

   There was a main effect of Ability Group ($F[2,44] = 6.04, p < .01$), but there was no significant difference between the high- and the average-ability groups at any of the four assessment times. However, the high-ability group scored higher than the low-ability group at every assessment time ($t[36] = -2.33, p < .05$; $t[36] = -2.30, p < .05$; $t[36] = -3.46, p < .001$; $t[36] = -2.34, p < 05$ at the first to fourth time respectively). Also the average-ability group scored higher than the low-ability group at the second ($t[22] = 3.53, p < .01$) and third ($t[22] = 2.31, p < .05$) but not at the first or fourth test time. The low-ability group's score continued to increase in its second preschool year, when the ratings of the high- and average-ability groups remained constant. Therefore, by the fourth assessment time the difference between the low-ability group and the high-ability group was substantially reduced.

3. *Self-Management.* All three ability groups made significant gains over time and their ratings were higher in their second than in their first preschool year (main effect of Year $F[1,44] = 161.0$, $p < .0000$). The gains made were greater in the first than in the second year (Year x Time interaction $F[1,44] = 5.3$, $p < .05$).

   There was a main effect of Ability Group ($F[2,44] = 5.3$, $p < .05$) but there was no significant difference between the high- and average-ability groups at any of the four assessment times. The high-ability group scored higher than the low-ability group at each of the first three assessment times ($t[36] = -2.43$, $p < .05$; $t[36] = -2.23$, $p < .05$; $t[36] = -2.55$, $p < .05$ respectively) but not at the fourth time. The average-ability group scored higher than the low-ability group at the second ($t[22] = 3.02$, $p < .01$) but not at the first, third or fourth assessment times.

   Note that at the end of their two years in preschool there were no significant differences among the three "A" groups on Self-Management.
4. *Curiosity and Exploration.* All three ability groups made significant gains over time on this scale and their ratings were higher in the second than in the first year ($F[1,44] = 34.3$, $p < .00000$). Also they gained about as much in their second as in their first preschool year.

   There was no effect of Ability Group on this measure. There was no significant difference between the high- and the average-ability groups at any of the assessment times; the high-ability group scored higher than the low-ability group at only one assessment time (the third: $t[36] = -2.58$, $p < .05$) and the average-ability group scored higher than the low-ability group at only one assessment time (the second: $t[22] = 2.38$, $p < .05$).
5. *Creativity.* All three ability groups made significant gains over time and their ratings were higher in the second than in the first year (main effect of Year $F[1,44] = 112.1$, $p < .0000$). The gains made were greater in the first than in the second year (Year x Time interaction $F[1,44] = 10.1$, $p < .01$).

   There was a main effect of Ability Group ($F[2,44] = 11.1$, $p < .0001$), but the differences between the high- and average-ability groups were not significant at any of the four assessment times. The high-ability group scored higher than the low-ability group at all four assessment times ($t[36] = -2.11$, $p < .05$; $t[36] = -3.53$, $p < .001$; $t[36] = -4.15$, $p < .001$; $t[36] = -4.03$, $p < .001$ at the first to fourth time respectively) and the size of the difference between them progressively increased. The average-ability group also scored higher than the low-ability group not at the first assessment time, but at the second ($t[22] = 2.36$, $p < .05$), third ($t[22] = 2.10$, $p < .05$) and fourth ($t[22] = 2.46$, $p < .05$) times.

6. *Imagination.* All three ability groups made significant gains and their scores were higher in their second than in their first preschool year (main effect of Year $F[1,44] = 139.0$, $p < .0000$). The gains made were greater in their first than their second year (Year x Time interaction $F[1,44] = 32.9$, $p < .0000$).

   There was a main effect of Ability Group ($F[2,44] = 3.7$, $p < .05$) but the group which scored highest on this measure at the second, third and fourth assessment times was the average-ability rather than the high-ability group. The difference between these two groups was, however, significant at only one assessment time (the second: $t[36] = 2.03$, $p < .05$). The low-ability group was also rated relatively high on this scale. There was no significant difference between the low- and the high-ability groups at any of the four assessment times and the average-ability group scored higher than the low-ability group at only one time (the second: $t[22] = 2.20$, $p < .05$).

The findings on all of the six rating scales are shown in Figure 8 and are reported in Table A-9 in the appendix.

The B/Average-Ability Group

The initial (fall) scores of the B/average group were significantly lower than those of the A/high-ability group (the high-income group) on all of the scales, at a time when there were no significant differences between the A/high and A/average groups. The t ratios were as follows: Self-Direction $t(38) = 2.30$, $p < .01$; Mastery Motivation $t(38) = 2.94$, $p < .01$; Self-Management $t(38) = 3.46$, $p < .001$; Curiosity $t(38) = 3.42$, $p < .01$; Creativity $t(38) = 3.89$, $p < .001$; Imagination $t(38) = 3.12$ $p < .01$. They were also consistently lower than those of the A/average group and significantly lower on four of the six scales: Self-Direction $t(24) = 2.32$, $p < .05$; Self-Management $t(24) = 2.45$, $p < .01$; Curiosity $t(24) = 2.34$, $p < .05$; and Imagination $t(24) = 3.86$, $p < .001$. They were also somewhat lower, but not significantly lower, than the scores of the A/low group on Self-Direction, Self-Management, Curiosity and Imagination.

However, from fall to spring the B/average group made substantial gains and at the last assessment time (spring) there were no significant differences among the three low-income groups on any of the six scales and the A/high group scored higher than the B/average group on only two scales: Curiosity $t(38) = 2.09$, $p < .05$ and Creativity $t(38) = 2.45$, $p < .05$.

The results for the "B" group are shown along with those for the three "A" groups in Figure 8 and are reported in Table A-9 in the appendix.

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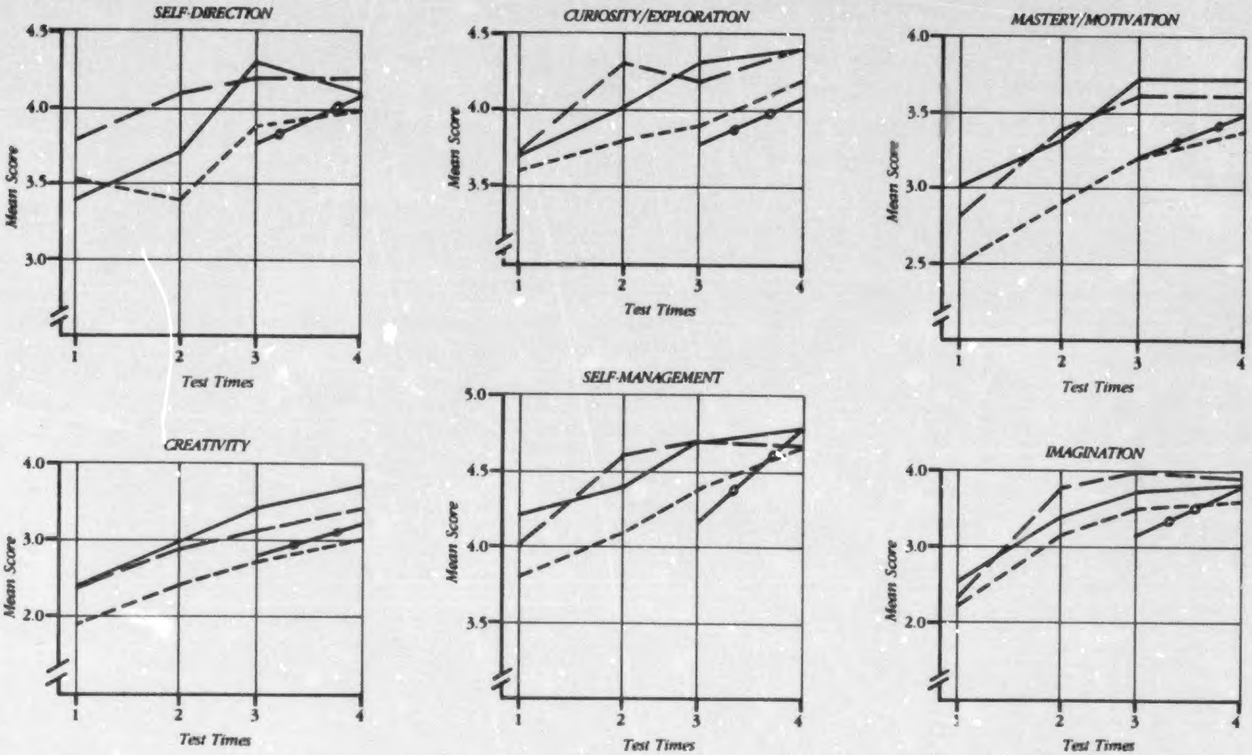

Figure 8

Changes in the Mean Teacher Rating Scale Scores Over Time by Ability Group

Summary: Problem-Solving and Cognitive Styles

The study of changes in the size of the differences among the three "A" groups: the high-income (high-ability) and the two low-income groups (average-ability and low-ability) over two years in the preschool yielded the following results:

1. All three ability groups made significant gains over time on all of the measures.
2. In general, ability and socio-economic status differences were not as effective determiners of performance on the measures of problem-solving and cognitive styles as they were on the tests used to measure intellectual and cognitive abilities. The average-ability (low-income) group performed just about as well on all of the measures as did the high-ability (high-income) group. Only one measure differentiated these two groups (Circus "Think It Through" and the significance of the difference was modest, $p < .05$). Differences were, however, found between the low-ability (low-income) group and the high-ability (high-income) group on most, but not all of the measures.
3. The low-ability (low-income) group scored lower than the high-ability (high-income) group on all of the measures except the rating scales for Self-Direction, Curiosity-Exploration and Imagination. The differences between these two groups decreased over time on Circus "Think It Through," KRISP errors and the rating scales for Mastery Motivation and Self-Management. However, they increased on the two measures of Creativity ("Make a Tree" and the teacher rating scale for Creativity). On reflection-impulsivity as measured by the KRISP, the low-ability group improved, relative to the high- and average-ability groups but continued to be more impulsive at the fourth test time.

The study of the changes in the size of the differences between the "B" low-income, average-ability group (which had no previous preschool experience) and the three "A" ability groups (which had a year of previous preschool experience) over one year in preschool, when all subjects were four- to five-year-olds, yielded the following results:

1. The initial (fall) scores of the B/average group were consistently lower than those of both the A/high- and the A/average-ability groups. They were significantly lower than the A/high-ability group on all of the measures except two of the three dimensions on Circus "Make a Tree" and were significantly lower than the A/average-ability group on Circus "Think It Through," the Appropriateness dimension of Circus "Make a Tree" and four of

the rating scales (Self-Direction, Self-Management, Curiosity-Exploration and Imagination). Also, on the KRISP, the A/average group made fewer errors than the B/average group. However, on reflection-impulsivity as measured by the KRISP, there was little difference between either the A/high and B/average groups or the A/average and B/average groups.

The scores of the B/average group were not significantly different from those of the A/low-ability group, but the B/average group was more reflective and less impulsive than the A/low-ability group.

2. During the year, the B/average group made substantial gains on most of the measures and by the end of its year in preschool was performing almost as well as the A/average group. However, the A/average group was, at this time, still performing more like the A/high-ability group than was the B/average group on Circus "Think It Through," KRISP errors and the rating scales of Curiosity-Exploration and Creativity.
3. When judged against American norms the B/average-ability group was achieving, at the end of its one year in preschool, at a below-average level on Circus "Think It Through" (as were the two "A" low-income groups) but at an average level on Circus "Make a Tree" (as was the A/average- but not the A/low-ability group).

SECTION 3: SOCIAL COMPETENCE

The "A" Groups

All three ability groups made significant PI,Q-ES gains over time and their scores were higher in their second than in their first preschool year ($F[1,44] = 43.9, p < .0000$). Significant gains were made from fall to spring by all groups in both their first and second years, but their gains were greater in the second than in the first year (Year x Time interaction $F[1,44] = 4.60, p < .05$).

These findings are shown in Figure 9 and are reported in Table A-10 in the appendix.

Averaging over time the high-ability group scored higher than the average-ability group and the average-ability group scored higher than the low-ability group. (Main effect of Group $F[2,44] = 5.60, p < .01$.) However, the size of the differences among the groups changed over time and was greater at the second and third, than at the first and fourth assessment times. In their first preschool year none of the differences among these three groups was large enough to be significant, but from the first (fall) to the second (spring) test time a difference between the

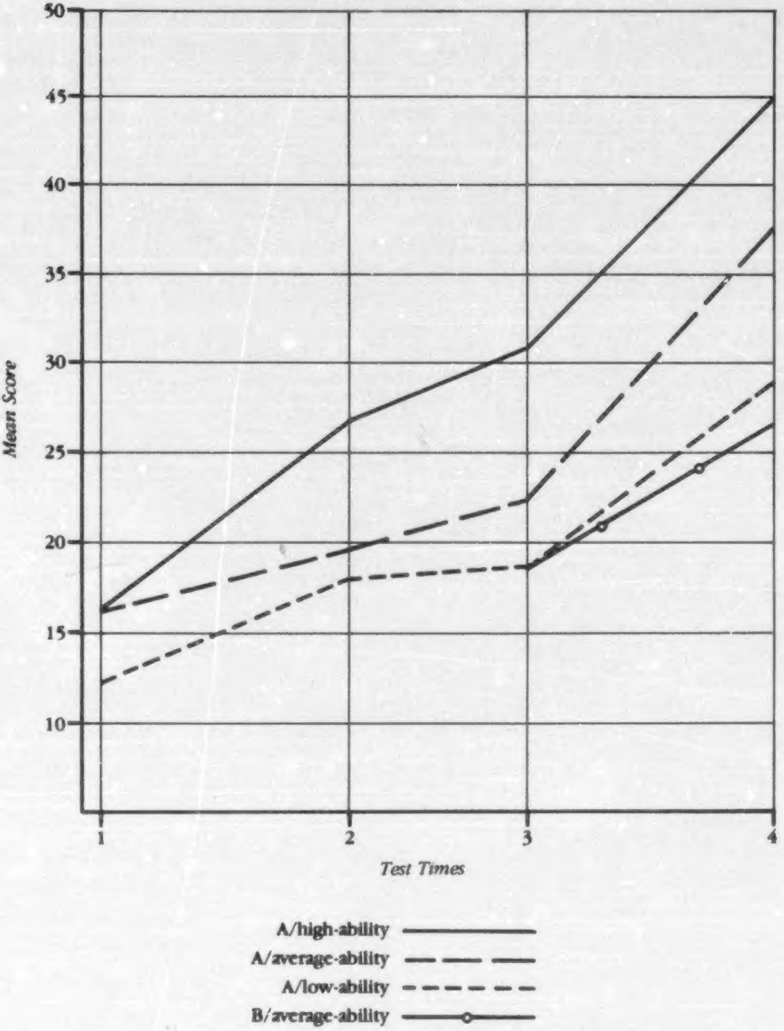

Figure 9

Changes in the Mean PI,Q-ESs Over Time by Ability Group high-ability (high-income) group and each of the two low-income groups (average- and low-ability) began to emerge and, at the third test time (beginning of their second preschool year) the high-ability group scored significantly higher than both the average-ability ($t[36] = 2.09$, $p < .05$) and the low-ability ($t[36] = 3.11$, $p < .01$) groups. However, in their second preschool year, the low-income groups began to gain somewhat more than the high-income group. As a result, at the fourth test time there was no significant difference between the mean scores of the high-ability and the average-ability groups and the size of the difference between the high- and the low-ability groups was reduced ($t[36] = 2.22$, $p < .05$).

The B/Average-Ability Group

The initial PI,Q-ES of the B/average-ability group was somewhat lower, but not significantly lower, than that of the A/average-ability group. However, the A/average group was scoring more like the A/high-ability group than was the B/average group at this test time and the size of the difference between the B/average- and A/high-ability groups ($t = 3.29$, $p < .01$) was as great as the difference between the A/low-ability and the A/high-ability (high-income) groups.

From fall to spring all three of the "A" groups (high-, average- and low-ability) made somewhat greater gains than the B/average-ability (low-income) group and at the end of its one year in preschool the B/average group was still scoring significantly lower than the A/high-ability (high-income) group ($t = 2.79$, $p < .01$). This was in marked contrast to the two "A" low-income groups. As was reported above, by the end of their two years in preschool, A/average- was scoring at a level which was not significantly different from that of the A/high-ability group and the difference between the A/low and A/high groups had been reduced ($p < .05$).

Sex Differences

As was reported in Chapter 7, boys tended to obtain higher PI,Q-ESs than girls. The analysis of the "A" group data (two years in preschool) yielded a main effect of Sex ($F[1,44] = 9.57$, $p < .01$) and the boys scored higher than the girls at the second ($t[48] = 2.32$, $p < .05$) and third ($t[48] = 2.68$, $p < .01$) but not at the first or fourth test times. Therefore, it was necessary to take sex, as well as ability, into account in examining the effects of two years as compared with only one year of preschool experience.

Two Years vs. One Year of Preschool

Of the high-ability *boys* in the project, 11 were in the program for two years, starting at age three, and five were in the program for only one year, starting at age four. The final mean PI,Q-ES of the boys with two years in preschool was 52.2 (*SD* 4.6), significantly higher than that (25.4, *SD* 8.7) of the boys with only one year in preschool ($t[15] = 3.3$, $p < .01$) and this difference could not be accounted for by age.

Of the average-ability *boys* in the project, five were in the program for two years, starting at age three, and eight were in the program for only one year starting at age four. The final mean PI,Q-ES of the boys with two years in preschool was 39.6 (*SD* 10.1) higher, but not significantly higher, than that (28.6, *SD* 16.2) of the boys with only one year in preschool.

Of the average-ability *girls* in the project, seven were in the program for two years starting at age three and six were in the program for only one year starting at age four. The final mean PI,Q-ES of the girls with two years in preschool was 36.4 (*SD* 24.7), higher, but not significantly higher, than that (24.7, *SD* 12.6) of the girls with only one year in preschool.

Summary: Social Competence Across Groups

The study of changes in the size of the differences among the three "A" groups: the high-income (high-ability) and the two low-income groups (average-ability and low-ability) over two years in the preschool yielded the following results:

1. All three ability groups made significant gains in social competence with their peers over time and their gains were greater in their second than in their first preschool year.
2. Ability was positively related to social competence as measured by the PI,Q-ES. Although there were no *initial* differences among the three ability groups, suggesting that their prior opportunities for learning about peers had been about equal, the differences between the high-ability and each of the two groups with less ability (average and low) increased significantly from the fall of their first, to the fall of their second preschool year (i.e., when given an opportunity to learn, the group with the most ability made the greatest gains). However, during their second year in preschool the program appeared to have compensatory effects for the two low-income groups for they began to make greater gains than before. As a result, by the end of their two years in preschool,

there was no significant difference between the scores of the high-ability (high-income) group and the average-ability (low-income) group and the size of the difference between the high-ability and the low-ability (low-income) groups had been substantially reduced.

3. Sex was related to social competence as measured by the PI,Q-ES. Overall, boys tended to obtain the higher scores. However, the program appeared to have compensatory effects for the girls, because at the last assessment time the girls obtained scores which were not significantly different from those of the boys.

The study of changes in the size of the differences between the "B" groups with no previous preschool experience and the "A" groups with a year of previous preschool experience, over one year in the preschool when all subjects were four- to five-years-old, yielded the following results:

1. The initial (fall) PI,Q-ES of the B/average-ability group was lower, but not significantly lower than that of the A/average-ability group and was about the same as that of the A/low-ability group.
2. In its first, and only year in preschool, the B/average group gained less than did the two "A" low-income groups, who were in their second preschool year, and the difference between B/average and each of the "A" groups increased. At the end of the year the difference between the B/average- and the A/high-ability groups was still highly significant at a time when the difference between the A/average- and A/high-ability groups was no longer significant.
3. Examination of the data by sex as well as ability showed (a) that the high-income (high-ability) boys with two years in preschool obtained significantly higher PI,Q-ESs than their high-income (high-ability) counterparts with only one year of preschool and (b) that the low-income (average-ability) children, both boys and girls, with two years of preschool, obtained higher, although not significantly higher PI,Q-ESs than their low-income (average-ability) counterparts with only one year of preschool.

SECTION 4: DISCUSSION

Two Years in Preschool: The "A" Groups

Since the three "A" groups were studied over two years, increases in their raw scores were expected, due to their increasing age, and such increases did, of course, occur. If the preschool program was particularly stimulating it was expected that their age-controlled scores (IQs and Percentile scores) would also increase, and that their raw scores would reflect improvements in their performance levels when judged against normative data for the tests. Results of this kind were also obtained for all three ability groups, suggesting that both the high-income and the low-income children had derived benefits from the program which had increased their intellectual, cognitive and social competence. More difficult to predict, however, was the type of results which would justify the conclusion that the program had been "compensatory" for the low-income children, or had "made up for" a lack of home-based stimulation.

Regarding compensatory effects the following assumptions were made: (a) that achievement would be a function of both ability (as measured by IQ) and environmental opportunity for learning and development; (b) that if ability was the more important operating variable, given equal opportunities to learn, the differences between any two groups which differed in IQ would increase over time, with the groups with higher IQs making greater gains; (c) that if environmental opportunity for learning and development was the more important operating variable, given equal opportunity for learning and development, the differences between any two groups of children which differed in previous opportunity for learning and development would decrease over time, with the group with less previous opportunity making the greater gains. Thus, it was argued that if the differences in the achievements of any two groups, which differed in ability, did *not* increase over time, or if they decreased over time, it could be inferred that opportunity to learn was the more important operating variable and that the program had been "compensatory" or had "made up for" a lack of previous opportunity to learn.

In the preliminary analyses of the data, we found that ability was a powerful predictor of achievement on the measures employed in the study and there were wide individual differences in the IQs of the subjects. It was necessary, therefore, to divide the subjects into ability groups. The high-income children represented a high-ability group with above average intelligence and the low-income children represented two ability groups: an average-ability group with average intelligence and a low-ability group with below-average intelligence.

The effects of "ability" on changes in performance were most marked within the low-income sample, especially on the measures of conceptual abilities (Preschool Inventory and Circus "How Much and How Many"). The average-ability group made greater gains than the low-ability group and the differences between them greatly increased. This suggests that the two low-income groups were fairly equally disadvantaged with respect to previous opportunity for learning and development in these areas and that the difference in their ability was, therefore, the more effective operating variable in determining their achievements in the preschool.

Because IQ was such an effective determiner of achievement on the two measures of conceptual ability, it is remarkable that the differences between the average-ability and the high-ability groups did not increase over time and did, instead, decrease to a point at which they were no longer significant. It is noteworthy that on Circus "How Much and How Many" between-group differences did increase during the groups' first preschool year, but then decreased in their second preschool year. It is also perhaps more remarkable that the low-ability group made greater gains than the high-ability group on the Preschool Inventory and made comparable gains on Circus "How Much and How Many." The low-ability group did not, like the average-ability group, "catch up" to the high-ability group on these measures, but it reduced the difference between them on the Preschool Inventory and did not fall further behind on Circus "How Much and How Many." These findings suggest that the difference in previous opportunity for learning, between the low- and the high-income children, was so great that this, rather than ability, was the more effective variable in determining the achievements of the low-income children in the program relative to those of their high-income counterparts. Therefore, these findings provide strong evidence in support of the conclusion that the program had marked compensatory effects on the conceptual abilities of the low-income children, especially when they were in their second preschool year.

On IQ, the effect of the program was, for the high- and average-ability groups, greater in their first than in their second preschool year. The low-ability group also made large gains in its first preschool year, but then lost them and had to regain them in the second year. Over the two years, the low-ability group made greater IQ gains than the other two groups, but needed the full two years to stabilize them.

The impact of the program on IQ was also greater on the average-ability (low-income) group than on the high-ability (high-income) group. This was not surprising because it was expected, initially, that the home-based stimulation given the high-income children would likely be sufficient to bring their IQs up to a level which was consistent with their potential. However, it was surprising that as many as half of the high-income subjects made significant and often very large IQ gains in the program, suggesting that some of them had also been "disadvantaged" with respect to early cognitive stimulation.

The findings obtained with the language tests were unexpected. Because of the Head Start literature in which socio-economic differences in language ability were so frequently reported and the need of low-income children for language training was so often emphasized, it was anticipated that large differences in the language abilities of the low- and the high-income children would be found. However, they turned out to be relatively modest. There were no socio-economic differences in receptive language ability, as measured by the Preschool Inventory, or in productive language ability, as measured by the Narration section of Circus "Say and Tell." The low-income children performed less well than the high-income children on Functional language, but this difference was reduced over time. Thus, the only language measure on which significant socio-economic differences which persisted over time were found was Description. In this the children were asked direct questions which required a "right" answer. This may have been too threatening for the low-income children, or may have caused them to resist, because, for whatever reason, the low-income children tended to "block" on this measure more often than did the high-income children. This is reminiscent of the "clamming up" that has often been said, in the Head Start literature, to be characteristic of culturally disadvantaged children such as black ghetto youngsters, especially when they are tested by whites.

It was in part because of these kinds of findings in the language area that early in the development of the program two decisions were made: (1) not to focus on language per se, but to focus on conceptual development, and (2) to make a special effort to help the low-income children feel more comfortable with teachers in face-to-face situations of an instructional type. The small-group and individual teacher-guided sessions were introduced into the program in part to help achieve these purposes.

In the problem-solving and cognitive styles area the socio-economic differences were, by and large, not as great as those found in the intellectual and cognitive ability areas. On most measures there were no differences between the high-ability (high-income) and the average-ability (low-income) group and on the one test on which such a difference did emerge, in their second preschool year (Classification on Circus "Think It Through"), it was relatively modest. However, the low-ability, low-income group scored lower than the high-ability (and average-ability group) on most measures, although not on all of them.

The measures on which the high-income and even the low-ability, low-income group did not differ significantly were the rating scales of Self-Direction, Curiosity-Exploration and Imagination. As judged by their teachers, the low-ability, low-income children were just as competent as the high-income children with respect to these cognitive styles. This is an important finding because it suggests that these very disadvantaged children had not lost their natural impulse (intrinsic motivation) to explore and learn about their world and were still equipped to respond to, and benefit from, an active-discovery, play-oriented type of program. This finding is important, because it provides evidence which argues against the view currently held by many early childhood educators, that low-income children are apathetic, lacking in curiosity and imagination and the ability to direct their own activities and therefore must be pressured into learning and "taught" in a direct way in a highly structured program.

For the low-ability group the program appeared to be particularly compensatory on Self-Management, for at the last assessment time this group was rated as high on this scale as were the other two groups. It was also compensatory on problem-solving (Circus "Think It Through"), the tendency to be impulsive (as measured by the KRISP) and Mastery Motivation—the differences between the low-ability group and the other two groups on these cognitive styles decreased over time. The only area in which the program did not appear to be strongly compensatory for the low-ability group was Creativity. The differences between the low-ability group and each of the other two groups (high- and average-ability) increased, rather than decreased, over time on the two measures in which an attempt was made to assess Creativity (Circus "Make a Tree" and the rating scale for Creativity).

On social competence with peers the program produced, by the end of two years, compensatory effects for both the average-ability (low-income) and the low-ability (low-income) group. However, two years of preschool experience were required to produce these effects. The results obtained in this area during the groups' first preschool year were the kind predicted if the groups were equal in previous opportunities for learning, but different in ability. The initial PI,Q-ESs of the three ability groups were not significantly different, but from the fall of their first to the fall of their second preschool year the difference between the high-ability (high-income) group and each of the two low-income groups (average- and low-ability) greatly increased. Thus, in the fall of their second preschool year the high-ability (high-income) group scored significantly higher than both the average-ability (low-income) and the low-ability (low-income) group. It was, therefore, in the second preschool year that compensatory effects were obtained. By the end of their two years in preschool the difference between the high-ability (high-income) group and the average-ability (low-income) group was no longer large enough to be significant, and the size of the difference between the high-ability (high-income) group and the low-ability (low-income) group had been reduced.

One Year vs. Two Years in Preschool: The "B" vs. the "A" Groups

The "B" low-income children were enrolled in the program when they were four years old and were compared with the "A" children who already had one academic year of preschool experience which started when they were three years old. The "B" low-income children had average ability, as measured by their Binet IQs, and the critical comparison was, therefore, the one with the "A" low-income group with average ability.

It was predicted that, if the first year of preschool had had a marked effect on the "A" low-income average-ability group, its scores should be higher at the beginning of its second preschool year than the scores of the "B" low-income average-ability group at the start of its first preschool year. It was also predicted that if two years in preschool were more effective in producing performance gains than only one year, then at the end of its two years in preschool the "A" low-income group with average ability should be achieving at a higher level than the "B" low-income group with average ability.

It should be recalled that the "ability" of the groups was determined on the basis of the means of the two IQ scores each child obtained during his or her second year in an early education program. Thus, when the "B" low-income group was enrolled in the preschool its mean IQ was lower than that of the A/average-ability group. During its first year in preschool the "B" group made IQ gains which were greater than those made by the A/average-ability group in its second preschool year and by the spring test time the IQ difference between them was no longer significant. It is noteworthy that the IQ gain made by the B/average-ability group in its first year in preschool at age four to five was just about as great as the IQ gain made by the A/average-ability group in its first preschool year at age three to four years.

In the *conceptual areas*, as measured by the Preschool Inventory and Circus "How Much and How Many," the benefits of the A/average-ability group's first year in preschool were reflected not so much in the initial differences, but in the final differences between this group and the B/average-ability group. At the beginning of the year in which these groups were compared, the A/average-ability group consistently scored higher than the B/average group, but the differences between them were not always large enough to be significant. However, the gains made by the A/average-ability group in its second year in preschool were greater than those made by the B/average-ability group in its first preschool year. Thus, by the end of two years in preschool, the A/average group was obtaining scores which were significantly higher than those of the B/average-ability group, and which were comparable to those of the A/high-ability (high-income) group. In contrast, the B/average-ability group was, at the end of its one year in preschool, achieving at a level which was no higher than that of the A/low-ability group. These findings suggest that the stimulation given the A/average-ability group in its first year in preschool had equipped it to derive greater benefits from the program in the conceptual areas in its second preschool year than would have been possible without it.

In the *problem-solving and cognitive styles* area the benefits of the A/average-ability group's first year in preschool *were* reflected in the initial differences between this group and the B/average-ability group. The fall scores of the A/average group were higher than those of the B/average-ability group on all of the measures (except reflection-impulsivity on the KRISP) and significantly higher on most of them. However, it was in this area that the B/average-ability group made its greatest gains in its first preschool year. During the year the B/average group reduced the size of the differences between it and the A/average-ability group on all of the measures. Thus, at the end of the year, although it was not performing (as was the A/average-ability group) at a level comparable to the A/high-ability group, the B/average group had accomplished a substantial amount of "catching up."

These findings suggest that two years were more effective than only one year in preschool for producing stabilized compensatory effects in the intellectual and conceptual abilities areas, but that only one year in preschool, starting at age four, was almost as successful as two years in producing compensatory effects in the problem-solving and cognitive style areas.

In the *peer social competence* area, as measured by the PI,Q-ES, the benefits of the A/average-ability group's first year in preschool were reflected, as in the conceptual areas, not so much in the initial difference, but in the final difference between this group and the B/average-ability group. At the beginning of the year in which they were compared, the A/average group scored higher, but not significantly higher, than the B/average group. However, the PI,Q-ES gain made by the A/average group in its second preschool year was greater than that made by the B/average group in its first preschool year. Thus, at the final assessment time, the PI,Q-ES of the A/average group was significantly higher than that of the B/average group. At the end of its two years of preschool the A/average group was performing at a level which was not significantly different from that achieved by the A/high-ability group, but the difference between the B/average- and A/high-ability groups had increased over the year and continued to be highly significant.

When *sex differences* on the PI,Q-ES were taken into account, it was found that two years as compared with only one year of preschool appeared to have a greater effect on the high-income (high-ability) boys who were studied than on either the low-income boys or the low-income girls. The final PI,Q-ES of the group of high-income boys with two years in preschool was more than twice as high as the score of those with only one year of preschool.

To sum up, for the children who were in the preschool for two years, the impact of the program on their intellectual and cognitive competence was greater in the first rather than in the second preschool year. This was, however, truer for the high-ability, high-income group than for the two low-income groups. By the end of its first year in preschool the high-ability group appeared to be functioning at a level which was consistent with its potential, and although in its second preschool year it continued to make significant gains, these were not as great as before. In contrast, the two low-income groups appeared to need two years to achieve a level of performance which was consistent with their potential. It was in its second preschool year that the average-ability group made its greatest gains on some measures (e.g., Circus "How Much and How Many") and "caught up" to the high-ability group. Also, it was in its second preschool year that the low-ability group finally stabilized its IQ gains (as indicated later in the follow-up study) and improved its performance levels relative to those of the high-ability group. On social competence, however, the impact of the program on all three ability groups, but especially on the average-ability group, was greater in their second than in their first preschool year. This appeared to be due more to the benefits derived during their first preschool year than to any changes related to their age, because the children who entered the program at four years of age made much smaller PI,Q-ES gains than did the four-year-olds who were in their second preschool year.

The findings suggest that, for the low-income children, the compensatory effects of the program followed a fairly consistent pattern. During their first year in preschool they made substantial IQ gains and improved their problem-solving, cognitive and learning styles. They also improved their conceptual abilities and their social competence with peers, but not enough to reduce significantly the gaps between them and the high-income children and in some areas the differences between the income groups even increased. However, the benefits derived from their first preschool year appeared to "pay off" in the second year, for in this year they made gains which were often greater than those made by the high-income group and in some cases even "caught up" to them in spite of the differences in their ability.

The low-income children who entered the program as four-year-olds also appeared to be following this pattern. In their first preschool year they made their greatest gains in the same areas as did the children who entered the program as three-year-olds (i.e., in IQ and problem-solving, cognitive and learning styles). The benefits of their year in preschool then appeared to "pay-off" in kindergarten, when they made slightly, although not significantly, greater gains than the A/average-ability group on the cognitive and language measures. In the follow-up study, which is described in Chapters 10 to 12, the children in Group A were not divided into ability groups for reasons which will be explained later. However, the cognitive data obtained in kindergarten were analyzed by ability group. The results are appended to this chapter (see Figure A-1 in Appendix A). By the end of kindergarten the differences between the A/average- and B/average-ability groups in the intellectual and cognitive areas were not entirely eliminated, but they were no longer large enough to be significant.

In conclusion, these results provide strong evidence that the preschool program offered the low-income children in this project produced marked compensatory effects for them and that these effects were greater for those who were enrolled as three-year-olds and had two years in the program than for those who were enrolled as four-year-olds and had only one year in the program.

Appendix A

TABLES AND FIGURE

Table A-1 *Mean Binet IQs by Group and Ability Sub-Group at Each Test Time.*
Table A-2 *Mean Preschool Inventory Scores by Group and Ability Sub-Group at Each Test Time*
Table A-3 *Mean Circus "Say and Tell," Form A Scores by Group and Ability Sub-Group at Each Test Time*
Table A-4 *Mean Circus "How Much and How Many," Form A Scores by Group and Ability Sub-Group at Each Test Time*
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Table A-7 *Mean KRISP Error and Latency Scores by Group and Ability Sub-Group at Each Test Time*
Table A-8 *Percentage of Subjects in Each KRISP Reflection-Impulsivity Category by Group and Ability Sub-Group at Each Test Time*
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Figure A-1 *Changes in the Mean Scores of the Three Low-Income Ability Groups in Kindergarten*

Table A-1

Mean Binet IQs by Group and Ability Sub-Group at Each Test Time

	GROUP A						GROUP B		
Test Time	*High-income high-ability*		*Low-income average-ability*		*Low-income low-ability*		*Test Time*	*Low-income average-ability*	
	n	X *(SD)*	n	X *(SD)*	n	X *(SD)*		n	X *(SD)*
1	20	110.8 (11.2)	7	94.7 (11.7)	9	81.7 (8.3)			
2	20	118.4 (12.9)	7	101.4 (11.9)	9	92.8 (10.0)			
3	26	114.8 (11.6)	12	106.2 (8.8)	12	84.0 (8.2)	1	14	95.2 (11.5)
4	26	116.6 (12.2)	12	107.6 (9.3)	12	95.1 (11.3)	2	14	101.1 (10.5)

Table A-2

Mean Preschool Inventory Scores by Group and Ability Sub-Group at Each Test Time

		GROUP A				GROUP B
Score	Test Time	High-income high-ability (n = 26) X (SD)	Low-income average-ability (n = 12) X (SD)	Low-income low-ability (n = 12) X (SD)	Test Time	Low-income average-ability (n = 15) X (SD)
Personal-Social	1	11.0 (2.6)	6.5 (3.5)	5.3 (3.3)		
	2	14.7 (2.0)	11.3 (3.9)	8.3 (3.4)		
	3	16.2 (1.9)	13.7 (2.4)	10.8 (2.6)	1	10.8 (4.2)
	4	16.8 (0.9)	16.2 (1.6)	13.7 (2.4)	2	13.5 (2.9)
Associative Vocabulary	1	4.1 (2.7)	2.2 (1.6)	1.5 (1.9)		
	2	7.1 (2.5)	5.0 (2.7)	3.4 (3.1)		
	3	8.2 (2.4)	6.7 (2.4)	5.8 (2.6)	1	5.1 (2.8)
	4	9.4 (2.2)	8.2 (1.5)	6.9 (2.9)	2	6.5 (2.9)
Concept Number	1	5.7 (2.6)	2.4 (2.8)	2.3 (2.4)		
	2	9.0 (3.1)	5.6 (2.1)	4.9 (3.2)		
	3	10.5 (2.4)	7.8 (2.2)	5.3 (3.1)	1	7.3 (2.7)
	4	12.8 (2.0)	11.4 (1.4)	8.5 (2.5)	2	9.3 (3.2)
Concept Sensory	1	11.6 (3.7)	7.2 (2.9)	3.8 (3.7)		
	2	15.5 (2.0)	13.0 (2.0)	8.6 (3.9)		
	3	16.5 (2.0)	14.6 (3.1)	11.3 (4.5)	1	12.8 (3.6)
	4	18.1 (1.1)	18.0 (1.1)	15.4 (3.0)	2	15.3 (2.6)
Don't Know[1]	1	7.5 (4.9)	16.7 (10.5)	23.5 (15.2)		
	2	2.4 (3.2)	5.7 (10.1)	11.6 (8.7)		
	3	1.1 (1.4)	2.3 (3.9)	6.4 (7.7)	1	5.1 (7.1)
	4	0.4 (0.8)	1.2 (1.8)	2.3 (2.7)	2	3.3 (6.0)
Total Raw Score[2]	1	32.6 (8.9)	18.3 (9.2)	12.4 (9.5)		
	2	46.4 (7.5)	34.9 (8.7)	25.2 (11.4)		
	3	51.4 (6.5)	42.8 (6.5)	33.2 (10.5)	1	36.1 (11.9)
	4	57.2 (4.8)	53.8 (4.2)	44.5 (8.8)	2	44.7 (9.3)
Percentile Score	1	70.6 (25.2)	25.8 (28.5)	16.0 (25.7)		
	2	93.9 (8.8)	73.7 (22.0)	42.8 (27.6)		
	3	95.9 (6.6)	83.8 (13.5)	56.6 (26.4)	1	64.9 (29.8)
	4	97.8 (3.2)	95.7 (3.8)	76.1 (19.0)	2	75.4 (22.3)

[1] "Don't Know" scores are not included in total.

[2] U.S. national means and *SD*s for Total Raw Score

children aged 3 years to 3 years, 11 months	25.6 (9.8)
children aged 4 years to 4 years, 5 months	30.0 (10.1)
children aged 4 years, 6 months to 4 years, 11 months	33.9 (10.5)
children aged 5 years to 5 years, 5 months	38.4 (10.1)

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Table A-3

Mean Circus "Say and Tell" Form A Scores by Group and Ability Sub-Group at Each Test Time

		GROUP A						*GROUP B*		
Score	*Test Time*	*High-income high-ability*		*Low-income average-ability*		*Low-income low-ability*		*Test Time*	*Low-income average-ability*	
		n	X *(SD)*	n	X *(SD)*	n	X *(SD)*		n	X *(SD)*
Description	1	20	5.6 (1.8)	7	3.9 (2.3)	9	2.4 (2.1)			
	2	20	7.2 (1.2)	7	4.9 (0.9)	9	5.0 (1.0)			
	3	26	8.2 (1.8)	12	6.1 (2.0)	12	5.8 (2.5)	1	14	4.8 (3.0)
	4	26	8.9 (1.3)	12	7.1 (1.2)	12	6.8 (1.7)	2	14	7.07 (2.1)
Functional Language	1	20	41.5 (7.7)	7	20.0 (17.2)	9	16.2 (15.2)			
	2	20	51.4 (7.5)	7	36.0 (8.8)	9	25.9 (19.0)			
	3	26	54.5 (9.2)	12	43.4 (8.0)	12	34.3 (10.9)	1	14	36.9 (16.2)
	4	26	58.5 (7.9)	12	50.5 (6.2)	12	44.7 (12.2)	2	14	46.6 (14.2)
Narration	1	20	55.4 (32.1)	7	51.6 (9.6)	9	43.1 (45.9)			
Number of Words	2	20	61.4 (43.8)	7	53.9 (9.5)	9	60.7 (51.3)			
	3	26	63.3 (27.8)	12	67.2 (42.5)	12	32.4 (18.9)	1	14	47.1 (26.2)
	4	26	65.5 (32.2)	12	59.9 (32.9)	12	52.6 (46.6)	2	14	50.5 (27.3)
Number of Different Words	1	20	26.4 (16.0)	7	27.1 (7.4)	9	19.9 (15.6)			
	2	20	31.4 (18.9)	7	30.6 (4.2)	9	24.4 (17.7)			
	3	26	30.6 (11.6)	12	32.5 (17.0)	12	18.2 (10.4)	1	14	23.7 (11.6)
	4	26	35.9 (14.2)	12	31.2 (14.0)	12	28.8 (22.1)	2	14	26.9 (12.7)
Quality	1	20	4.4 (2.1)	7	4.9 (1.5)	9	3.3 (2.2)			
	2	20	5.5 (1.9)	7	5.7 (1.5)	9	3.9 (2.0)			
	3	26	5.2 (1.7)	12	5.0 (2.5)	12	3.3 (2.0)	1	14	4.2 (1.5)
	4	26	5.7 (2.3)	12	4.8 (1.8)	12	5.0 (2.5)	2	14	4.6 (1.7)

Note:
U.S. national means and *SDs*

Description	8.78 (2.87) Preschool;	8.87 (2.18) Kindergarten
Functional Language (Total)	49.49 (12.99) Preschool;	50.97 (13.74) Kindergarten
Narration		
words (n)	41.72 (29.80) Preschool;	43.12 (27.19) Kindergarten
different words (n)	26.15 (17.54) Preschool;	27.13 (15.76) Kindergarten
quality	4.12 (2.33) Preschool;	4.11 (2.14) Kindergarten

Table A-4

Mean Circus "How Much and How Many" Form A Scores by Group and Ability Sub-Group at Each Test Time

	GROUP A							*GROUP B*		
Score	*Test Time*	*High-income high-ability*		*Low-income average-ability*		*Low-income low-ability*		*Test Time*	*Low-income average-ability*	
		n	X *(SD)*	n	X *(SD)*	n	X *(SD)*		n	X *(SD)*
Counting	1	20	5.1 (3.0)	7	4.0 (1.4)	9	2.1 (2.1)			
	2	20	7.0 (2.7)	7	5.1 (2.9)	9	2.8 (2.5)			
	3	26	8.4 (2.3)	12	6.3 (2.7)	12	4.5 (2.2)	1	14	6.1 (3.0)
	4	26	9.8 (2.0)	12	8.8 (2.0)	12	6.3 (3.0)	2	14	7.8 (2.3)
Relational Terms	1	20	8.6 (3.4)	7	6.6 (1.9)	9	3.7 (3.4)			
	2	20	11.0 (2.4)	7	8.4 (2.0)	9	6.8 (4.1)			
	3	26	11.6 (1.9)	12	10.3 (1.6)	12	8.1 (2.8)	1	14	8.6 (3.6)
	4	26	13.3 (0.9)	12	13.1 (0.8)	12	11.3 (2.1)	2	14	10.4 (3.3)
Numerical Concepts	1	20	6.6 (2.5)	7	6.9 (2.2)	9	3.1 (2.5)			
	2	20	8.0 (2.2)	7	5.6 (2.3)	9	4.9 (2.3)			
	3	26	9.0 (2.6)	12	8.1 (1.6)	12	6.6 (2.7)	1	14	6.6 (2.2)
	4	26	10.1 (2.2)	12	8.7 (2.6)	12	7.3 (2.1)	2	14	8.4 (1.5)
Total Score	1	20	20.2 (7.5)	7	17.6 (4.4)	9	8.9 (7.3)			
	2	20	26.0 (5.7)	7	19.1 (5.8)	9	14.4 (7.9)			
	3	26	29.0 (5.3)	12	24.7 (3.9)	12	19.2 (6.7)	1	14	21.2 (7.8)
	4	26	33.2 (3.8)	12	30.6 (3.9)	12	24.9 (5.8)	2	14	26.5 (5.4)

Note:

U.S. national means and *SDs*

Counting	8.31 (2.89) Preschool;	9.23 (2.74) Kindergarten
Relational Terms	11.15 (2.65) Preschool;	12.02 (2.12) Kindergarten
Number Concepts	8.58 (2.66) Preschool;	9.27 (2.53) Kindergarten
Total Score	28.05 (7.06) Preschool;	30.53 (6.21) Kindergarten

Table A-5

Mean Circus "Think It Through" Form A Scores by Group and Ability Sub-Group at Each Test Time

	GROUP A							GROUP B		
Score	*Test Time*	*High-income high-ability*		*Low-income average-ability*		*Low-income low-ability*		*Test Time*	*Low-income average-ability*	
		n	X *(SD)*	n	X *(SD)*	n	X *(SD)*		n	X *(SD)*
Problem Identification	1	20	3.2 (0.8)	7	2.7 (1.4)	9	1.3 (1.1)			
	2	20	3.2 (1.5)	7	3.4 (0.8)	9	2.9 (1.6)			
	3	26	3.9 (1.1)	12	3.8 (1.1)	12	3.4 (1.4)	1	14	3.4 (1.7)
	4	26	4.2 (1.1)	12	4.1 (1.2)	12	3.9 (1.5)	2	14	3.2 (1.3)
Classification	1	20	6.0 (2.4)	7	4.0 (3.0)	9	1.8 (1.5)			
	2	20	8.9 (3.0)	7	7.1 (2.7)	9	3.7 (3.0)			
	3	26	10.1 (3.3)	12	7.7 (2.3)	12	5.3 (3.3)	1	14	6.0 (2.8)
	4	26	11.7 (3.5)	12	9.2 (2.9)	12	8.6 (3.8)	2	14	8.6 (3.6)
Solution Evaluation	1	20	5.0 (1.7)	7	4.3 (1.5)	9	1.8 (1.9)			
	2	20	5.6 (2.1)	7	5.3 (1.4)	9	3.3 (1.9)			
	3	26	6.8 (2.1)	12	6.0 (1.3)	12	4.1 (2.3)	1	14	3.7 (1.9)
	4	26	7.8 (1.1)	12	7.3 (0.9)	12	6.3 (1.7)	2	14	7.0 (0.8)
Total Score	1	20	14.2 (3.2)	7	11.0 (4.8)	9	4.9 (3.8)			
	2	20	17.6 (5.4)	7	15.9 (4.1)	9	9.9 (5.3)			
	3	26	20.8 (5.0)	12	17.4 (3.4)	12	12.8 (6.2)	1	14	13.1 (5.2)
	4	26	23.7 (4.7)	12	20.6 (3.8)	12	18.8 (3.5)	2	14	18.8 (4.7)

Note:

U.S. national means and *SDs*

Problem identification	4.01 (1.27) Preschool;	4.08 (1.28) Kindergarten
Classification	10.98 (3.58) Preschool;	11.32 (3.46) Kindergarten
Solution evaluation	6.54 (1.99) Preschool;	6.77 (1.89) Kindergarten
Total score	21.53 (5.67) Preschool;	22.18 (5.39) Kindergarten

Table A-6

Mean Circus "Make a Tree" Scores by Group and Ability Sub-Group at Each Test Time

	GROUP A										*GROUP B*			
Score	*Test Time*	*High-income high-ability*			*Low-income average-ability*			*Low-income low-ability*			*Test Time*	*Low-income average-ability*		
		n	X	*(SD)*	n	X	*(SD)*	n	X	*(SD)*		n	X	*(SD)*
Appropriate	1	20	1.2	(0.4)	7	1.2	(0.6)	9	1.1	(0.3)				
	2	20	1.9	(1.2)	7	1.0	(0.0)	9	1.3	(0.7)				
	3	26	2.2	(1.1)	12	2.0	(1.1)	12	1.9	(1.3)	1	8	1.1	(0.4)
	4	26	2.8	(1.2)	12	2.3	(1.3)	12	1.8	(0.9)	2	13	2.5	(1.5)
Unusual	1	20	1.2	(0.4)	7	1.3	(0.5)	9	1.2	(0.3)				
	2	20	1.7	(0.9)	7	1.1	(0.2)	9	1.4	(0.6)				
	3	26	2.4	(1.3)	12	2.4	(1.4)	12	1.5	(0.9)	1	8	1.7	(0.7)
	4	26	2.7	(1.2)	12	2.5	(1.2)	12	1.6	(1.0)	2	13	2.2	(1.0)
Difference	1	20	2.2	(1.0)	7	2.2	(1.5)	9	2.4	(1.2)				
	2	20	2.5	(1.3)	7	1.0	(0.0)	9	1.7	(1.0)				
	3	26	3.0	(1.5)	12	2.6	(1.4)	12	2.0	(1.3)	1	8	2.0	(1.5)
	4	26	3.3	(1.3)	12	2.9	(1.4)	12	2.8	(1.5)	2	13	3.1	(1.7)

Note:
U.S. national means and *SDs* (5-point scale)

Appropriate	2.1 (0.9) Preschool;	2.6 (0.7) Kindergarten
Unusual	2.0 (1.[illegible]) Preschool;	1.7 (0.8) Kindergarten
Difference	2.3 (1.1) Preschool;	2.9 (1.4) Kindergarten

Table A-7

Mean KRISP Error and Latency Scores by Group and Ability Sub-Group at Each Test Time

	GROUP A										GROUP B			
	Test Time	*High-income high-ability*			*Low-income average-ability*			*Low-income low-ability*			*Test Time*	*Low-income average-ability*		
		n	X	*(SD)*	n	X	*(SD)*	n	X	*(SD)*		n	X	*(SD)*
Errors	1	20	11.1	(5.3)	6[a]	10.3	(5.1)	5[a]	16.6	(8.1)				
	2	20	3.6	(2.8)	7	3.0	(1.9)	9	8.7	(4.1)				
	3	26	3.2	(2.0)	12	4.3	(3.1)	12	7.3	(4.6)	1	13[a]	6.5	(5.5)
	4	26	1.8	(1.5)	12	1.6	(1.4)	12	4.2	(3.1)	2	15	3.1	(3.0)
Latency	1	20	4.1	(1.5)	6[a]	3.5	(1.1)	5[a]	2.9	(1.8)				
	2	20	4.9	(2.1)	7	4.0	(1.1)	9	4.2	(1.4)				
	3	26	4.0	(1.4)	12	3.9	(1.7)	12	4.0	(1.4)	1	13[a]	3.6	(1.5)
	4	26	3.8	(1.0)	12	4.2	(1.0)	12	4.2	(1.2)	2	15	4.6	(1.4)

[a] Note the smaller n at test time 1. Some low-income children were not testable on this measure at the first test time

Table A-8

Percentage of Subjects in Each KRISP Reflection-Impulsivity Category by Group and Ability Sub-Group at Each Test Time

	GROUP A				GROUP B	
	Test Time	*High-income high-ability*	*Low-income average-ability*	*Low-income low-ability*	*Test Time*	*Low-income average-ability*
Reflective (slow-accurate)	1	10.0	—	—		
	2	35.0	—	—		
	3	15.4	—	—	1	7.7
	4	7.7	—	8.3	2	14.3
Average or fast-accurate	1	45.0	42.9	22.2		
	2	60.0	100.0	77.8		
	3	65.4	66.7	50.0	1	61.5
	4	88.5	100.0	58.3	2	71.4
Impulsive (fast-inaccurate)	1	45.0	42.9	33.3		
	2	5.9	—	11.1		
	3	19.2	33.3	50.0	1	30.8
	4	3.8	—	33.3	2	14.3
Other						
(a) untestable	1	—	14.3	44.4		
(b) slow-inaccurate	2	—	—	11.1		
	3	—	—	—	1	—
	4	—	—	—	2	—

Table A-9

Mean Teacher Rating Scale Scores by Group and Ability Sub-Group at Each Test Time

	GROUP A										*GROUP B*			
Score	*Test Time*	*High-income high-ability*			*Low-income average-ability*			*Low-income low-ability*			*Test Time*	*Low-income average-ability*		
		n	X	*(SD)*	n	X	*(SD)*	n	X	*(SD)*		n	X	*(SD)*
Self-Direction	1	26	3.4	(0.7)	12	3.8	(0.5)	12	3.5	(0.5)				
	2	26	3.7	(0.7)	12	4.1	(0.5)	12	3.4	(0.7)				
	3	26	4.3	(0.4)	12	4.2	(0.5)	12	3.9	(0.5)	1	14	3.8	(0.5)
	4	26	4.1	(0.5)	12	4.2	(0.5)	12	4.0	(0.5)	2	14	4.0	(0.6)
Mastery Motivation	1	26	3.0	(0.5)	12	2.8	(0.7)	12	2.5	(0.6)				
	2	26	3.3	(0.6)	12	3.4	(0.4)	12	2.9	(0.4)				
	3	26	3.7	(0.4)	12	3.6	(0.4)	12	3.2	(0.4)	1	14	3.2	(0.7)
	4	26	3.7	(0.5)	12	3.6	(0.3)	12	3.4	(0.3)	2	14	3.5	(0.5)
Self-Management	1	26	4.2	(0.5)	12	4.0	(0.5)	12	3.8	(0.6)				
	2	26	4.4	(0.4)	12	4.6	(0.4)	12	4.1	(0.3)				
	3	26	4.7	(0.3)	12	4.7	(0.3)	12	4.4	(0.4)	1	14	4.2	(0.7)
	4	26	4.8	(0.2)	12	4.7	(0.3)	12	4.7	(0.3)	2	14	4.8	(0.4)
Curiosity/Exploration	1	26	3.7	(0.7)	12	3.7	(0.5)	12	3.6	(0.6)				
	2	26	4.0	(0.6)	12	4.3	(0.3)	12	3.8	(0.6)				
	3	26	4.3	(0.5)	12	4.2	(0.5)	12	3.9	(0.6)	1	14	3.8	(0.5)
	4	26	4.4	(0.5)	12	4.4	(0.4)	12	4.2	(0.4)	2	14	4.1	(0.5)
Creativity	1	26	2.4	(0.6)	12	2.2	(0.6)	12	1.9	(0.6)				
	2	26	3.0	(0.5)	12	2.9	(0.6)	12	2.4	(0.6)				
	3	26	3.4	(0.4)	12	3.1	(0.4)	12	2.7	(0.5)	1	14	2.8	(0.6)
	4	26	3.7	(0.5)	12	3.4	(0.4)	12	3.0	(0.4)	2	14	3.2	(0.7)
Imagination	1	26	2.5	(0.8)	12	2.3	(0.7)	12	2.2	(0.5)				
	2	26	3.4	(0.6)	12	3.8	(0.6)	12	3.2	(0.6)				
	3	26	3.7	(0.5)	12	4.0	(0.5)	12	3.5	(0.5)	1	14	3.2	(0.6)
	4	26	3.8	(0.5)	12	3.9	(0.3)	12	3.6	(0.4)	2	14	3.8	(0.4)

Table A-10

Mean PI,Q-ESs by Group and Ability Sub-Group at Each Test Time

	GROUP A			*GROUP B*	
Test Time	*High-income high-ability (n = 26)*	*Low-income average-ability (n = 12)*	*Low-income low-ability (n = 12)*	*Test Time*	*Low-income low-ability (n = 14)*
	X *(SD)*	X *(SD)*	X *(SD)*		X *(SD)*
1	16.2 (9.4)	16.2 (12.9)	12.2 (11.1)		
2	26.5 (14.4)	19.8 (12.2)	18.0 (12.5)		
3	30.7 (11.6)	22.3 (11.0)	18.8 (9.5)	1	18.7 (9.7)
4	44.7 (21.4)	37.8 (18.2)	28.8 (18.3)	2	26.9 (14.4)

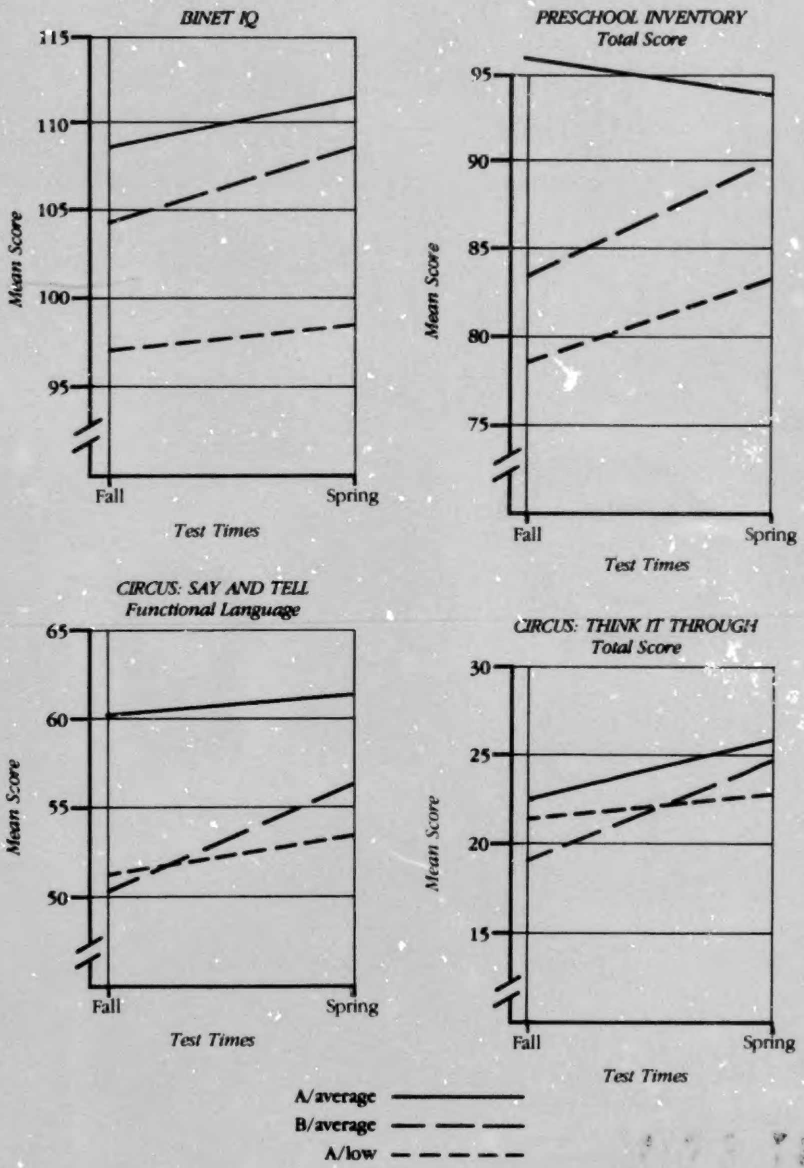

Figure A-1

Changes in the Mean Scores of the Three Low-Income Ability Groups in Kindergarten

10

Summative Evaluation: The Long-Term Impact— Objectives and Method, with Results at the Kindergarten Level

The primary purpose of the follow-up study was to assess the long-range effects of the UWO Preschool Program on the performance of the low-income children after they entered the primary grades. Would these children maintain the intellectual and cognitive gains they had made in the preschool? Would they adjust better to school, be better academic achievers and fail less often than comparable children who had no preschool experience? Would those who entered the preschool as three-year-olds and had two years in the program be more successful than those who entered as four-year-olds and had only one year in the program?

Different types of preschool programs have been successful in inducing immediate IQ and other types of gains in low-income children (Weikart, 1967; Klaus & Gray, 1968; Bereiter, 1972) but these gains have appeared to be lost after one or two years in the primary grades (Bronfenbrenner, 1974). Over time the size of the initial differences between the test scores of the preschool graduates and their controls have gradually diminished, due in part to a reduction in the performance levels attained by the preschool graduates, but also to gains made by the control subjects after they entered the kindergarten. However, in several recent follow-up studies (Palmer, Note 1; Weikart, Bond & McNeil, 1978) it has been found that after six or seven years in the elementary school significantly more of those with preschool experience than their controls were in the appropriate grade for their age. Such findings have been interpreted by some as "sleeper" effects and it has been suggested that the benefits of preschool experience are not likely to show up when children are learning basic skills in the primary grades, but only when they meet greater cognitive challenges later on. However, if the controls "failed" a year more frequently than those from the preschools this probably began even at the primary levels.

Currently in Canada, there is a growing public demand for universally available pre-kindergarten education in the public schools. If this demand is met, at what age should children be enrolled? There is some evidence that youngsters who start preschool as three-year-olds make greater immediate intellectual gains and maintain these gains better than children who start preschool as four-year-olds or children who start school in kindergarten as five-year-olds (Beller, Note 2). Although the maintenance of the gains may be a function of the amount of preschool experience, rather than the age at preschool entrance, this finding, if verified, would have important practical implications. On the other hand if it were not verified, that is if one year of preschool experience which starts when the child is a four-year-old is as effective, in the long run, as two years of preschool, then the practice, common in most municipalities, of not admitting children until they are four-year-olds would have some research support. Because of the practical importance of this issue, we attempted to assess the differential long-range effects of two years of preschool starting at age three, and one year of preschool starting at age four on children's later academic achievement.

Although the focus in the follow-up study was on the children's intellectual and cognitive competence and academic achievement, an attempt was also made to assess their personal and social adjustment in the school setting and their attitudes toward teachers and school work.

METHOD

Subjects

Preschool graduates (PGs). All of the children from low-income families (but not those from high-income families) who were studied in the preschool and were subsequently enrolled in the London public and separate schools, or the Middlesex County public schools, were followed up. They will be referred to as preschool graduates (PGs). In all, there were 36 PGs, 24 who started preschool as three-year-olds and attended for two years (Group A) and 12 who started preschool as four-year-olds and attended for only one year (Group B). These subjects were described in the report on the immediate impact of the program (see Chapter 8).

It should be noted, however, that in the follow-up study, the 24 subjects in Group A were not divided, as they were in the study of the immediate impact of the program, into two ability groups (an average- and a low-ability group) based on their mean IQs in their second preschool year. In the immediate impact study this division of Group A was made necessary by the findings (a) that ability was a highly effective predictor of achievement on all of the measures employed, and (b) that Group B had significantly more ability than Group A. Group B had average ability which was comparable to that of the 12 subjects in Group A with the most ability (the average-ability group), but which was significantly higher than that of the 12 subjects in Group A with the least ability (the low-ability group). It is important to keep this in mind when comparing the primary grade achievements of Group A and Group B, because Group B, with only one year of preschool, had more ablity than Group A and for this reason alone it was expected that Group B might do better in the primary grades than Group A.

Control subjects. The control group (Group C) was made up of children from low-income families who had no previous preschool or day nursery experience and were enrolled in an early education program for the first time as five-year-olds in kindergarten. These subjects were selected on the basis of age, sex, SES and test scores as described below to equate this group as closely as possible with Group A. It included, as did Group A, children with average ability as well as children with low ability. There were 30 children in this group.

Selection procedure for the control subjects. The primary selection criterion was the Preschool Inventory Percentile Score. It was chosen for this purpose because the authors of the test claim that it reflects the degree of disadvantage a child has suffered. The Stanford-Binet Intelligence Test was also used as a supplementary criterion measure. The control subjects selected were ones who obtained scores on these measures, at entry into kindergarten, which were comparable to the scores obtained on them by the PGs when they were first enrolled in the preschool. The tests were administered to the control subjects, as they had been to the preschoolers, no sooner than six weeks after they had been enrolled for the first time in school.

Suitable control subjects were extremely difficult to find. This was primarily because the school authorities were not permitted, for ethical reasons, to reveal any information about the socio-economic status of families. They could provide information only about whether or not children had had any preschool experience. The initial intention was to select the controls from only those schools in which the PGs were enrolled, but by the second year, for two reasons, this plan was abandoned. First it was not yielding enough subjects. Second, the PGs were being enrolled in so many different schools and were changing schools so frequently that to avoid any possible school-of-enrollment effects it was decided that the controls should also be enrolled in as many schools as were the PGs. To increase the likelihood of finding low-income families, schools located near subsidized housing were included. Also the cooperation of public health officers and nurses was finally obtained and these provided the names of a number of potential subjects.

Before the pre-testing was done, parental permissions were obtained. A letter (see letter #1, Appendix A) explaining the project and seeking permission to study a child was sent out to some 200 or more families. About two thirds replied and agreed to let their child participate. Thus, approximately 125 children were pre-tested. After the testing, a preliminary selection of subjects was made based on age, sex and test scores. Then the procedure for determining the socio-economic status of the families (the final selection criterion) was initiated. SES was judged (as it was for the PGs) on the basis of information obtained from the parents during semi-formal, scheduled interviews and home visits. (See letter #2 requesting interview and Parent Interview Form in Appendix A.) In these interviews rapport was established with the families, and the interviewer also made sure the child had not had any previous preschool experience and had no special disability which would make him or her unsuitable for the project. After the SES index of the families was estimated, the final selection of control subjects was made and the families of those who had not been selected for further study were notified (see letter #3, Appendix A).

Schools Attended and School Changes

All but one of the control subjects were enrolled in the public schools, but a quarter of the PGs were enrolled in the separate (Roman Catholic) schools. In some schools there were both PGs and controls, but in others there were only PGs or only controls. Many of the families were highly mobile and their children changed schools frequently. The following provides data on these variables for the last two years of the project.

In 1977-78 when there were 36 PGs and 24 controls in the project, these 60 children were in 28 different schools. In eight there were both PGs and controls, but in 13 there were only PGs and in seven only controls. During that year 30% of the PGs and 4% of the controls changed schools once or more. In 1978-79 when there were 34 PGs and 28 controls in the project, these 62 children were in 35 different schools.

In nine of these schools there were both PGs and controls, but in 15 there were only PGs and in 11 only controls. During this year 24% of the PGs and 32% of the controls changed schools once or more.

General Description of the Total Sample

The subjects in each group are described individually by age, sex, SES index, Preschool Inventory Percentile Score and Binet IQ (when available) at entry into the project (at the preschool or kindergarten level) in Appendix B. A summary description of the groups studied at the kindergarten level is presented in Table 10.

SES. In general the controls appeared to be, if anything, somewhat *less* disadvantaged than the PGs. Only 40% of them were from single-parent families as compared with 50% in Group A and 80% in Group B. However, the mean SES index (Blishen, 1967) of Group C (32.8, *SD* 7.5) which was based on the usual occupation of the heads of the families (mother in single, father in intact), if or when they were employed, was not significantly higher than the means of the other two groups (30.5, *SD* 3.9 and 30.1 *SD* 5.7 for A and B respectively). The educational level that the family heads claimed they had achieved was slightly higher in Group B than in the other two groups with Groups A and C being about equal. The percentage in each group claiming attainment at each of three levels was for A, B and C respectively, as follows:

Above Grade 10:	12.5	16.6	17.2
Grade 9 or 10:	50.0	66.7	48.3
Grade 8 or below:	37.5	16.7	34.5

Ethnicity. Most, but not all, of the children were white. There were four native (Indian) subjects in Group A (three girls, one boy), one black girl in Group B and one native (Indian) girl and one black boy in Group C.

Pre-test scores. The initial mean Preschool Inventory Percentile scores of the groups suggested that Group A was more disadvantaged than the other two groups. Group A's score (20.9) was significantly lower than Group B's (61.0) and Group C's (59.3) score (both $p < .01$). However, their initial mean IQ scores (87.4, 93.2, 90.5 for A, B and C respectively) were not significantly different.

For sex, Groups A and C were fairly well balanced with slightly more than half of the subjects in each being girls (54.2% in Group A and 53.3% in Group C) but in Group B there were proportionately more boys than girls (only 41.7% were girls).

For age, the groups were satisfactorily equated. Their mean age at entry into kindergarten was for A, B and C respectively 63.6, 63.3 and 62.3 months.

Table 10

Description of the Groups Studied at the Kindergarten Level by Sex, SES Index, Age at Entrance to Kindergarten, and Preschool Inventory Percentile Score and Binet IQ at Entrance Into the Project

Variable	*GROUP A (n = 24)*	*GROUP B (n = 12)*	*GROUP C (n = 30)*
Sex			
Males	11 (45.8%)	7 (58.3%)	14 (46.6%)
Females	13 (54.2%)	5 (41.7%)	16 (53.3%)
SES index			
X	30.5	30.1	32.8
SD	3.9	5.7	7.5
Range	27.8-44.2	27.3-47.6	27.0-51.7
Age at entering Kindergarten in months			
X	63.6	63.3	62.3
SD	3.0	3.8	3.1
Range	60-69	58-69	58-69
Preschool Inventory Percentile score at "entry into the project"[1]			
X	20.9	61.0	59.3
SD	27.0	31.8	25.4
Range	0-97	1-95	11-91
Stanford Binet IQ[2] at "entry into the project"			
X	87.4[2]	93.2[2]	90.5
SD	11.7	11.8	11.8
Range	68-112	71-106	60-108

Notes:

[1] "Entry into the project" was at approximately ages 3, 4 and 5 for Groups A, B and C, respectively.

[2] The mean Binet IQs for Groups A and B are based on 16 (of the 24) and 11 (of the 12) subjects respectively, because the Binet was not included in the test battery in the first year of the project.

Number of Post-Kindergarten Years Studied

All of the 66 subjects described above were followed up for one year after entry into kindergarten, but successively fewer were studied at each of the higher grade levels. This was because the preschool subjects entered kindergarten by cohort in five consecutive school years and new control subjects were also selected in each of these years. Thus, for example, only the first cohorts in Groups A and C had completed their fourth year in school by the end of the project. There was also some attrition in each of the groups over time. The number of subjects studied during their first to fifth year in school is shown by group and assessment time in Table 11.

Because both the size and constitution of the samples of each group studied beyond kindergarten changed by year in school, they will be described in greater detail later, just prior to the presentation of the results at each of the higher grade levels.

Assessment Instruments

An attempt was made to assess: (a) intellectual ability, cognitive competence and cognitive styles, (b) academic achievement and (c) personal-social adjustment in school.

Intellectual and cognitive competence measures. The Stanford-Binet Intelligence Scale was used at all levels. In addition, at the kindergarten level, the Preschool Inventory, two Circus tests (Form A), "Say and Tell" and "Think It Through," and the Kansas Reflection-Impulsivity Scale for Preschoolers (KRISP) were employed and, at the Grade 1 level, three Circus tests (Form B), "Say and Tell," "Think It Through" and "How Much and How Many," and the KRISP were used.

Academic achievement. This was assessed in two ways (a) through testing and (b) through teacher reports of progress and promotion. The tests used were the Stanford Early School Achievement Test, Level I (first year in school, i.e., kindergarten level), the Stanford Early School Achievement Test, Level II (second year in school), the Stanford Achievement Test Primary I Battery (fall) and Primary II Battery (spring) (third year in school) and the Stanford Achievement Test, Primary II Battery (fourth year in school). The report form used by the teachers was developed by the author. A copy of it is appended (see Appendix C). It was called the School Adjustment Report and included open-ended questions which permitted the teacher to comment freely on the child's behavior and abilities.

Personal-social adjustment. This was measured in part by teachers' responses to questions on the School Adjustment Report referred to above and by scores on a Behavior Rating Scale. A copy of the Behavior Rating Scale (with an explanation of how it was scored) is also included in the appendix (see Appendix D). It is a 50-item scale which assesses the extent to which children are "like" children who display behavior which has been found to be related to classroom achievement. Each child is rated on each item as "not at all like," "very little like," "somewhat like" or "very much like" on each item. The first 20 items of the scale were taken from a Behavior Inventory developed for assessing the outcome of Head Start programs (Hess, Kramer,

Table 11

The Number of Subjects Studied in Their First to Fifth Year in School by Group and Assessment Time

	FIRST (Kindergarten)		SECOND (Grade 1)		THIRD (Grade 2 or below)		FOURTH (Grade 3 or below)		FIFTH (Grade 4)	
GROUP	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
A	24	24	24	24	22	11	7	7	0	0
B	12	12	12	7	2	2	2	1	1	1
C	30	30	23	23	17	17	5	5	0	0
Total	66	66	59	54	41	30	14	13	1	1

Slaughter, Torney, Berry & Hull, 1966). Twenty-one of the next 30 items were taken from the Devereux Elementary School Behavior Rating Scale (Spivak & Swift, 1967). Nine additional items, made up by the present investigator, were included to obtain additional information.

Procedure

There were two assessment periods each year, one in the fall and the other in the spring. At the kindergarten level all tests were given in both the fall and the spring. However, at the post-kindergarten levels only the academic achievement tests (and the KRISP in Grade 1) were given at both the fall and spring assessment times. At these higher levels the Binet was given only in the fall, and at the first grade level the Circus tests were given only in the spring. The teachers completed the School Adjustment Report and the Behavior Rating Scale once during the school year (i.e., in the late spring).

At the kindergarten level the Preschool Inventory was given first (in October), no sooner than six weeks after the children were enrolled in school, and the Binet was administered approximately one week later. The rest of the tests were given in November in no fixed order. However, in the spring when tests given in the fall were re-administered (May-June) the children were tested in the same order as they had been tested in the fall. At the higher grade levels the children were also tested in the same order in the spring as in the fall.

Until the final year of the project there were four testers, one of whom administered only the initial preschool inventories. The other three did all the rest of the testing, but administered different tests at each assessment time to avoid expectancy effects. In the final year a professional psychologist, who had no knowledge about the children or the project, was hired to administer the Stanford-Binet to 16 subjects. This was done as a special reliability check on the scores. The children tested were those in the last cohort of each of the two PG groups (A and B).

RESULTS: FIRST YEAR IN SCHOOL (KINDERGARTEN)

Intellectual and Cognitive Competence

The mean scores of the three groups at the beginning and end of kindergarten on four of the measures used to assess intelligence and cognitive competence (Preschool Inventory Percentile Scores, Binet IQs, Circus "Say and Tell" functional language scores, and Circus "Think It Through" total scores) are presented in Table 12.

The data obtained with these tests were subjected to a series of 3(Group) x 2(Time: fall, spring) Analyses of Variance (ANOVAs). When significant effects were found post-hoc analyses were done using Dunn's Multiple Comparisons Test (Kirk, 1968).

Preschool Inventory. There was a main Group effect, $F(2,61) = 11.9$, $p < .01$. In the fall the scores of the two PG groups (A & B) were not significantly different but both of these groups scored higher than Group C ($p < .01$).

From fall to spring the two PG groups (A & B) maintained their end-of-preschool performance levels, but made no further significant gains and Group C gained more than the two PG groups (Group x Time interaction, $F[2,61] = 3.9$, $p < .05$).

In the spring the differences between the PG groups and the Control group were reduced, but Group A still scored higher than Group C ($p < .05$).

Binet IQ. There was a main Group effect, $F(2,61) = 10.4$, $p < .01$. In the fall the scores of the two PG groups (A & B) were not significantly different, but both of these groups scored higher than Group C ($p < .01$).

From fall to spring all three groups made significant gains, $F(1,61) = 17.0$, $p < .01$ and there were no significant differences among the groups in the size of these gains.

In the spring, both of the PG groups still scored higher than Group C ($p < .05$).

"Say and Tell" functional language. There was a main Group effect, $F(2,61) = 85.4$, $p < .01$. In the fall the scores of the two PG groups (A & B) were not significantly different but Group A (although not Group B) scored higher than Group C ($p < .01$).

From fall to spring all three groups made significant gains, $F(1,61) = 28.6$, $p < .01$.

Table 12

Mean and (SD) Scores on Four Measures of Intellectual and Cognitive Ability of the Groups at the Kindergarten Level by Assessment Time

	GROUP A *n = 24*				*GROUP B* *n = 12*				*GROUP C* *n = 30*			
	Fall		*Spring*		*Fall*		*Spring*		*Fall*		*Spring*	
	X	*(SD)*	*X*	*(SD)*	*X*	*(SD)*	*X*	*(SD)*	*X*	*(SD)*	*X*	*(SD)*
Preschool Inventory Percentile Score	87.7	(17.6)	87.2	(17.2)	83.3	(20.6)	89.8	(9.6)	59.3	(25.4)	72.3	(16.6)
Binet IQ	102.7	(10.2)	104.4	(11.3)	104.3	(9.0)	108.4	(8.3)	90.5	(11.8)	95.6	(11.6)
Circus "Say and Tell" Form A Functional Language	55.6	(8.2)	57.7	(8.5)	50.3	(16.0)	56.4	(10.6)	43.3	(6.9)	50.1	(8.6)
Circus "Think It Through" Total Scores	21.7	(3.3)	23.7	(3.8)	19.8	(5.2)	24.7	(4.5)	17.4	(4.9)	19.8	(4.3)

Note:
U.S. national means and (*SDs*) for the Circus tests at the kindergarten level:
"Say and Tell" functional language, 51.0 (13.7).
"Think It Through" total score, 22.2 (5.4).

In the spring, there were no significant differences among the three groups. However, it should be noted, that the two PG groups were both performing at a level equal to, or above, the U.S. national mean, but Group C was performing below that level.

"Think It Through" total scores. There was a main Group effect, $F(2,61) = 10.35$, $p < .01$. In the fall the scores of the two PG groups (A & B) were not significantly different but Group A (although not Group B) scored higher than Group C ($p < .01$).

From fall to spring all three groups gained ($F[1,61] = 29.4$, $p < .01$) but the gains were greater in Group B ($p < .01$) and Group C ($p < .05$) than in Group A.

In the spring both of the PG groups scored higher than Group C (Group A, $p < .01$; Group B, $p < .05$). It should be noted also that the two PG groups both scored at a level equal to or above the U.S. national mean, but Group C scored below that level.

Kansas Reflection-Impulsivity Scale for Preschoolers (KRISP). The number of subjects in each group who were classified, by their performance on this measure, as reflective, impulsive (or otherwise) at each assessment time are shown in Table 13. The classifications reflective, average or fast-accurate represent satisfactory performance.

In the fall 65% of Group A and 92% of Group B, but only 42% of Group C performed satisfactorily (as defined above) on this test.

In the spring 87% of Group A, 83% of Group B, but only 47% of Group C performed satisfactorily.

At both assessment times a larger proportion of the Control than the PG subjects performed impulsively (were fast and inaccurate).

Summary: Intellectual and Cognitive Competence

First, comparisons of the two PG groups A and B revealed the following:

1. At the beginning of the year the scores of these two groups were not significantly different on any of the measures.
2. From fall to spring, both groups maintained their preschool gains and on three measures (the Binet, "Say and Tell" functional language and "Think It Through") made further gains. Group B made greater gains than Group A on "Think It Through" and somewhat greater gains on "Say and Tell" functional language, but not on the Binet.
3. At the end of the year the scores of the two PG groups were still not significantly different.

Table 13

Percentage of Subjects in Each KRISP Category by Group and Assessment Time at the Kindergarten Level

	GROUP A		*GROUP B*		*GROUP C*	
	Fall	*Spring*	*Fall*	*Spring*	*Fall*	*Spring*
Reflective (slow-accurate)	17.4	21.7	8.3	33.3	3.3	3.3
Average	30.4	30.4	66.7	25.0	26.7	26.7
Fast-Accurate	17.4	34.8	16.7	25.0	10.0	16.7
Impulsive (fast-inaccurate)	30.4	4.3	8.3	8.3	56.7	36.6
Slow-Inaccurate	4.3	8.7	0	8.3	3.3	16.7

Second, comparisons of each of the two PG groups (A & B) with the Control group (Group C) revealed the following:

1. At the beginning of the year, Group A (on all five measures) and Group B (on three measures: Preschool Inventory, Binet and KRISP) performed significantly better than Group C.
2. From fall to spring Group C gained on the Preschool Inventory more than either of the two PG groups and gained more than Group A (but not Group B) on "Think It Through." However, there were no significant differences among the groups in the size of the gains made on the Binet or "Say and Tell" functional language.
3. At the end of the year, both of the PG groups scored higher than Group C on the Binet and "Think It Through" and both performed more satisfactorily on the KRISP. Also, Group A (although not Group B) scored significantly higher than Group C on the Preschool Inventory. By this time, however, the differences among the groups on "Say and Tell" functional language were not large enough to be significant.
4. At both the beginning and end of the year, the two PG groups performed on all measures at an average or above average level, but the performance of Group C was low average or below average on all of the measures.

Academic Achievement

The Stanford Early School Achievement Test, Level I. This is a battery of tests. It yields four sub-test scores (Environment, Mathematics, Letters and Sounds, and Aural Comprehension) as well as a total score.

The mean scores of the three groups on these measures at each of the assessment times are presented in Table 14.

The data obtained with these measures were subjected to a series of 3(Group) x 2(Time) ANOVAs followed by post-hoc analyses where indicated.

Environment. In the fall there was no significant difference between the scores of the two PG groups (A and B) but both of these groups scored higher than Group C, $F(2,60) = 11.54$, $p < .01$, (A, $p < .01$; B, $p < .05$). From fall to spring, significant gains were made $F(1,60) = 55.6$, $p < .01$ by Group A ($p < .05$) and Group C ($p < .01$) but not Group B. In the spring there was still no difference between Groups A and B, but Group A (although not Group B) scored significantly higher than Group C ($p < .05$).

Mathematics. In the fall the scores of the two PG groups (A and B) were not significantly different, but both of these groups scored higher than Group C, $F(2,60) = 10.6$, $p < .01$ (A, $p < .01$; B, $p < .05$). From fall to spring all three groups made significant gains, $F(1,60) = 60.3$, $p < .01$. In the spring there was still no significant difference between Groups A and B, but Group B (although not Group A) scored significantly higher than Group C ($p < .01$).

Letters and sounds. In the fall the differences among the three groups were not large enough to be significant. From fall to spring all three groups made significant gains, $F(1,60) = 86.8$, $p < .01$. In the spring there were still no significant differences among the groups.

Aural comprehension. In the fall the scores of the two PG groups (A and B) were not significantly different, but Group A (although not Group B) scored significantly higher than Group C, $F(2,60) = 98.5$, $p < .01$ ($A > C$, $p < .01$). From fall to spring significant gains were made, $F(1,60) = 29.5$, $p < .01$ by Group A ($p < .01$) and Group C ($p < .01$) but not Group B. In the spring there was still no significant difference between Groups A and B, but Group A (and not Group B) again scored significantly higher than Group C ($p < .01$).

Total score. In the fall the total scores of the two PG groups (A and B) were not significantly different and both of these groups scored higher than Group C, $F(2,60) = 12.3$, $p < .01$ ($A > C$, $p < .01$; $B > C$, $p < .01$). From fall to spring all three groups made significant gains, $F(1,60) = 14.8$, $p < .01$. In the spring there was still no significant difference between Groups A and B, and both of these groups scored higher than Group C (A, $p < .01$; B, $p < .05$).

Teacher judgments of academic achievement. The School Adjustment Reports were interpreted and analyzed by the principal investigator. To check the reliability of the interpretations, 20 of the reports (randomly selected from among the three groups) were scored independently by a second investigator. The agreement of the two investigators was 100%.

Table 14

Mean and (SD) Stanford Early School Achievement, Level I Scores by Group and Testing Time at the Kindergarten Level

	GROUP A		GROUP B		GROUP C	
Test	Fall (n = 23)	Spring (n = 23)	Fall (n = 11)	Spring (n = 11)	Fall (n = 30)	Spring (n = 30)
Environment	30.2 (5.7)	33.2 (4.2)	28.8 (5.7)	31.4 (4.7)	22.8 (4.9)	28.5 (5.4)
Mathematics	16.2 (4.5)	18.2 (4.5)	16.1 (4.2)	20.3 (3.6)	11.2 (3.5)	15.0 (4.5)
Letters and Sounds	14.9 (4.9)	19.0 (5.2)	15.9 (4.4)	20.7 (4.1)	11.6 (4.8)	16.5 (5.6)
Aural Comprehension	17.9 (4.0)	20.6 (3.2)	16.5 (5.4)	18.8 (5.1)	13.3 (3.6)	16.4 (4.7)
Total Score	79.0 (15.9)	91.0 (13.7)	77.3 (15.8)	91.2 (14.9)	58.2 (12.4)	76.4 (16.4)

Note:
Range of scores in Stanine 5 (average performance based on U.S. standardization data):

Beginning kindergarten (Fall)		*End of kindergarten (Spring)*	
Environment	26-29	Environment	33-35
Mathematics	12-13	Mathematics	19-21
Letters and Sounds	10-11	Letters and Sounds	17-20
Aural Comprehension	15-17	Aural Comprehension	19-21
Total Score	63-73	Total Score	87-96

The percentages of subjects assigned to each judgment category in the School Adjustment Report are presented by group in Table 15. No attempt was made to assess the statistical reliability of the apparent differences among the groups which this subjective measure revealed. The findings reported below should, therefore, be interpreted with caution. The results on academic competence were as follows:

1. *Academic Competence (item 9).* A larger percentage of the subjects in Group A (39%) than Group B (18%) or Group C (3%) were judged to be above average in academic competence and a smaller percentage of the subjects in Group A (13%) than Group B (27%) or Group C (41%) were judged to be below average.
2. *Preparation for School (item 3).* A larger percentage of the subjects in Group A (35%) than Group B (9%) *or* Group C (10%) were judged to have had above-average preparation for kindergarten work. Although this comparison suggested that Group B was no better prepared for school than Group C, a smaller percentage of the subjects in Group B (27%) than Group C (53%) were considered poorly prepared. Only 13% of the Group A subjects were judged to be poorly prepared.
3. *Academic Progress During the Year (item 4).* A larger percentage of the subjects in Group A (26%) than Group B (0%) or Group C (10%) were judged to have made above-average progress during

Table 15

Percentage of Subjects Assigned to Each Judgment Category of the School Adjustment Report by Group at the Kindergarten Level

1. How well has this child adjusted to your class?			
Group A	17.4 above average	78.3 average	4.3 below average
Group B	9.1 above average	72.7 average	18.2 below average
Group C	26.7 above average	53.3 average	20.0 below average
2. Are this child's attitudes toward school, teachers and school work positive?			
Group A	21.7 above average	73.9 average	4.3 below average
Group B	18.2 above average	81.8 average	0 below average
Controls	16.7 above average	73.3 average	10.3 below average
3. Was this child well prepared academically for the work of your class?			
Group A	34.8 above average	52.2 average	13.0 below average
Group B	9.1 above average	63.6 average	27.3 below average
Group C	10.0 above average	36.7 average	53.3 below average
4. How well has this child progressed academically during the current year?			
Group A	26.1 above average	60.9 average	13.0 below average
Group B	0 above average	72.7 average	27.3 below average
Controls	10.3 above average	69.0 average	20.7 below average
5. Did this child need remedial help?			
Group A	91.3 No	8.7 Yes	
Group B	72.7 No	27.3 Yes	
Group C	73.3 No	25.7 Yes	
6. Did this child attend school regularly?			
Group A	87.0 Yes	13.0 No	
Group B	90.9 Yes	9.1 No	
Group C	86.7 Yes	13.3 No	
7. Was this child promoted to the next grade?			
Group A	100.0 Yes	0 No	
Group B	100.0 Yes	0 No	
Group C	100.0 Yes	0 No	
8. What is your general appraisal of this child's personal and social competence?			
Group A	73.9 satisfactory	17.4 some concern	8.7 poor
Group B	36.4 satisfactory	54.5 some concern	9.1 poor
Group C	58.6 satisfactory	37.9 some concern	3.4 poor
9. What is your general appraisal of this child's academic competence?			
Group A	39.1 above average	47.8 average	13.0 below average
Group B	18.2 above average	54.5 average	27.3 below average
Group C	3.4 above average	55.2 average	41.4 below average

Notes:

Group A: Complete reports were obtained on only 23 of the 24 subjects, but all 24 were promoted.

Group B: Complete reports were obtained on only 11 of the 12 subjects, but all 12 were promoted.

Group C: Complete reports were obtained on all 30 subjects.

the year and a smaller percentage of the subjects in Group A (13%) than Group B (27%) or Group C (21%) were judged to have made below-average progress. Note that in these comparisons, Group B appeared to be progressing no more successfully than Group C.

4. *Special Instruction (item 5).* A smaller percentage of the subjects in Group A (9%) than Group B (27%) or Group C (26%) were given remedial help or special instruction. This finding was consistent with the one reported immediately above and suggested that Group B was judged to need as much special help as Group C.
5. *Promotion (item 7).* The decision to promote at this level did not differentiate the groups. The reports indicated that all subjects would be promoted to a first grade class.

Summary: Academic Achievement

Stanford Early School Achievement. Comparisons of the two PG groups (A and B) revealed the following:

1. At the beginning of the year there were no significant differences between these groups by sub-test or total score.
2. From fall to spring significant gains were made by Group A on all four sub-tests and the total score, and by Group B on two sub-tests (Mathematics and Letters and Sounds) and the total score.
3. At the end of the year there were still no significant differences between the scores of these two groups by sub-test or total score.

Comparisons of each of the two PG groups (A and B) with the Control group (Group C) revealed the following:

1. At the beginning of the year both of the PG groups obtained higher total scores than Group C. However, the sub-test score differences between them and Group C varied by sub-test and PG group. The differences were greatest on Environment and Mathematics, with both Groups A and B scoring higher than Group C, less on Aural Comprehension, with Group A (but not Group B) scoring higher than Group C, and least on Letters and Sounds on which differences among the three groups were not large enough to be significant.
2. From fall to spring Group C (like Group A) made significant gains on all four sub-tests and the total score, but Group B made significant gains on only two of the sub-tests and the total score.
3. At the end of the year both of the PG groups again obtained higher total scores than Group C, but the sub-test score differences between them and Group C still varied by sub-test and

PG group. Group A (but not Group B) scored higher than Group C on Environment and Aural Comprehension, but Group B (and not Group A) scored higher than Group C on Mathematics and there were (as in the fall) no significant differences among the three groups on Letters and Sounds.

4. The overall performance of the two PG groups, when judged against U.S. norms, was above average, or average, in both the fall and the spring, but the performance of the Control group was below average at both assessment times.

Teacher judgments. The teachers' judgments of the children favored Group A (which had two years of preschool experience) over Group B (which had only one year in preschool) on all items dealing with academic achievement. Furthermore, although they judged Group B to be somewhat more capable academically than Group C and somewhat better prepared for school, they considered the progress made by this group during the year to be no better than that made by Group C. These findings were puzzling because they were inconsistent with the results obtained with the Stanford achievement tests which suggested that Group B's academic performance was, more often than not, as satisfactory as that of Group A and clearly superior to that of Group C.

Personal-Social Adjustment

The School Adjustment Reports included questions about the social and personal adjustment of the children. The percentages of subjects in each group assigned to each judgment category in the personal and social areas were presented in Table 15. The findings were as follows:

1. *Personal-Social Competence (item 8).* A larger percentage of the subjects in Group A (74%) than in Group B (36%) or Group C (59%) were considered to be "well adjusted" personally and socially. Note that Group B was considered less "well adjusted" than Group C. The teachers expressed concern about, or reported "poor" adjustment for 64% of Group B, 41% of Group C and only 26% of Group A.
2. *Adjustment to the Classroom (item 1).* Only 17% of the subjects in Group A and only 9% of Group B as compared with 27% of Group C were said to have made "above-average" adjustments to the classroom. However, a smaller proportion of Group A (4%) than Group B (18%) or Group C (20%) were said to have made below-average adjustments.
3. *Attitude Toward School, Teachers and School Work (item 2).* The groups were not judged differently on this item and it is noteworthy that none of the Group B subjects' attitudes were considered below average.

The Behavior Rating Scale. The mean scores of the groups on each dimension assessed by this measure are presented in Table 16. The findings were as follows:

1. Scores on only one dimension, External Reliance, significantly differentiated both of the PG groups (A and B) from Group C, $F(2,61) = 6.1$, $p < .01$. The PGs were rated as *less* dependent on external direction (looked less to see what others were doing, relied less on teacher for direction about how to do things, needed less direction to proceed successfully, had less difficulty deciding what to do when given choices, were less swayed by the opinions of others) than were the Group C subjects.
2. On the dimension Inattentive-Withdrawn, the difference between Group A and both of the other two groups approached significance, $F(2,61) = 3.5$, $p < .04$. Group A was rated somewhat less inattentive and withdrawn than the other two groups. (Attended to teacher explanation longer, seemed to pay attention to teacher, i.e., looked elsewhere less often, was less often "not with it," was less difficult to reach, i.e., less preoccupied with own thoughts.)
3. On the other dimensions assessed, the trends generally favored Group A over the other two groups, but the differences among them were not large enough to be significant.

Table 16

Mean and (SD) Behavior Rating Scale Scores at the End of Kindergarten by Group

Dimension	*GROUP A (n = 23)*	*GROUP B (n = 11)*	*GROUP C (n = 30)*
1. Aggression[1]	12.6 (3.1)	11.9 (3.7)	13.0 (2.8)
2. Verbal-Social Interaction	11.9 (3.1)	10.8 (3.9)	11.8 (3.7)
3. Timidity[1]	12.7 (2.6)	11.0 (3.8)	11.6 (3.6)
4. Independence	12.3 (2.3)	10.9 (3.6)	10.7 (2.7)
5. Achievement Motivation	12.2 (2.8)	10.7 (3.0)	10.9 (3.0)
6. Impatience[1]	10.9 (3.4)	10.6 (3.2)	10.6 (2.9)
7. External Reliance[1]	14.1 (2.6)	13.0 (3.1)	11.2 (3.1)
8. Inattentive-Withdrawn[1]	12.6 (2.3)	9.9 (4.4)	10.7 (3.2)
9. Creative-Initiative	10.3 (2.9)	8.8 (4.1)	8.9 (3.4)
10. Need for Closeness	11.8 (3.0)	10.5 (2.8)	11.4 (3.3)
Total (all dimensions)	121.2 (18.5)	108.1 (28.4)	110.9 (22.3)
Ambition[2]	37.1 (6.2)	32.6 (9.4)	33.2 (8.2)

Notes:

[1] For Aggression, Timidity, Impatience, External Reliance, Inattentive-Withdrawn, higher scores indicate *less* of the behavior.

[2] "Ambition" is a combined score for Timidity, Independence and Achievement Motivation.

Summary: Personal-Social Adjustment

The teachers' judgments of the personal adjustment and social behavior of the groups were generally consistent with their judgments of the groups' academic ability and progress. By and large they tended to favor Group A over the other two groups but, in the personal-social area, also tended to favor Group C over Group B. It appeared that only one year in preschool (as opposed to two years) may have developed tendencies in the children, such as "internal" as opposed to "external" reliance which, when unaccompanied by other kinds of desirable behavior, were unacceptable to the teachers. The teachers' reactions to such tendencies may have, to some extent, generalized and affected their judgments of the children's academic ability. If so, this might account for why their assessments of Group B's academic ability and progress relative to that of either Group A or Group C, were inconsistent with Group B's actual performance on the achievement tests.

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Appendix A

LETTERS TO PARENTS, PARENT INTERVIEW FORM

LETTER #1

I am writing to ask if you would give us permission to include your child in a study of the effects of nursery school experience on the performance of young children in kindergarten and the primary grades.

Children who go to nursery schools learn things which often help them do well at school, at least in the first few years. However, children who have not had the opportunity to go to a preschool, often catch up to the nursery school children quite quickly and in the long run appear to do just as well.

We are studying the progress in kindergarten of a group of children who have attended preschool at the University and we would like to compare this with the performance of other children of the same sex and age who have not had any preschool experience. We understand your child has not been to a day nursery or nursery school and this is why we would like to include him/her in the study.

If you permit us to include your child in this project we would give him/her a series of tests in the fall (October) and again in the spring (May or June) to see how well he or she has progressed. The tests are rather like games which the child enjoys playing. His/her performance on the tests would be kept confidential and any report of the work would provide group rather than individual results.

We will be grateful if you will permit us to study the progress of your child and we will appreciate having your decision about this indicated on the form attached. This form should be returned to the school at your earliest convenience.

Sincerely,

Mary J. Wright, Ph. D., Professor and
Director, University Laboratory
Preschool

MJW/lv.
Encl.

CONSENT FORM

In response to Dr. Wright's request for permission to have

______________________________ participate in her study
Name of Child

Please check in the box below and sign.

Permission is given ☐ Date ____________________

Permission is not given ☐ Signed____________________
Parent or Parents

LETTER #2

Dear Parents:

This is, first of all, to thank you for giving us permission to include your child in our studies of the effects of pre-kindergarten experience on the performance of children in the kindergarten and primary grades. We greatly appreciated your interest and cooperation.

As you know, ______ was seen last fall by three different ladies. Everything went well and ______ seemed to enjoy the sessions. These same ladies are looking forward to seeing ______ again in May or early June.

Since the study will continue next spring and perhaps next year, we thought you might like to find out more about it and to meet at least one of the persons who will be working with your child. Hence, I have asked Mrs. Ada Meecham, whom I know you will like, to get in touch with you and arrange a short visit with you at home or elsewhere if you prefer, at a convenient time. She will be pleased to answer any questions you may have. She will also be grateful if you will give her some information about your child's health and development during ______ early years.

Mrs. Meecham will phone you sometime in the near future. We hope that you will be able to find the time to see her, for we very much look forward to getting to know you and your child better.

Many thanks again.

Sincerely,

Mary J. Wright, Ph.D., Professor and
Director, University Laboratory
Preschool.

MJW/lv.

UNIVERSITY OF WESTERN ONTARIO LABORATORY PRESCHOOL

Follow-Up Study

Parent Interview Form

Name of Child: ____________ Date of Interview: ____________

Name of Parent: ____________

Address: ________________________ Telephone: ____________

Person Interviewed: ________________
(mother, father, both, other)

Assessment of Socio-Economic Status

Marital Status: Married ___ Divorced ___ Separated ___
Widow ___ Single ___

Source of Income: Employment ___ Welfare ___ Mother's Allowance ___
Other ________________________

Home Conditions: ________________________
____

Father's Occupation: ________________________
Education: ________________________

Mother's Occupation: ________________________
Education: ________________________

Siblings (how many and age): ________________________
____

Other adults or children in the home: ________________________
____

Child's Developmental and Health History

Pregnancy: Full term ___ Premature ___

Health (any serious injury or illness; if so, describe): ____________
____

Sensory Equipment (vision, hearing): ________________________

Physical Deformities: ________________________

Special Behavioral or Management Problems: ____________
____

Summary (use reverse side if necessary)

____
____

LETTER #3

Dear Parent:

This is to thank you for giving us permission to include your child in our studies of the effects of pre-kindergarten experience on the performance of children in the kindergarten and primary grades. We greatly appreciated your interest and cooperation.

This is also to let you know that we examined a larger number of young children in the fall than we can continue to study over a longer time period and that we will not be testing your child again in the spring.

Again, let me say how grateful we were for your positive approach to our request.

Very sincerely,

Mary J. Wright, Ph.D. Professor and
Director, University Laboratory
Preschool

MJW/lv.

Appendix B

DESCRIPTION OF INDIVIDUAL SUBJECTS IN EACH GROUP BY AGE, SEX, SES INDEX, PRESCHOOL INVENTORY PERCENTILE SCORE AND BINET IQ AT ENTRY INTO THE PROJECT

GROUP A						*GROUP B*						*GROUP C*					
ubject #	*CA*[1]	*Sex*	*SES*	*PI*	*IQ*	*Subject #*	*CA*	*Sex*	*SES*	*PI*	*IQ*	*Subject #*	*CA*	*Sex*	*SES*	*PI*	*IQ*
1	3-0	F	28.1	3	(84)[2]	10	4-0	M	27.5	88	(112)[2]	201	5-6	F	27.8	11	92
2	3-2	F	31.3	0	(77)	44	4-0	M	29.0	12	78	202	5-9	F	27.0	76	93
3	3-3	F	34.6	3	(102)	102	4-8	M	27.8	60	99	203	4-11	F	44.2	89	103
4	3-0	M	30.1	3	(88)	104	4-7	F	27.8	79	102	204	4-10	M	49.6	76	92
6	3-1	F	30.9	17	(104)	105	4-9	M	47.6	95	104	205	4-11	M	27.3	82	94
7	3-6	F	32.1	56	(108)	106	4-1	F	27.8	91	106	207	5-5	F	27.8	25	77
8	3-8	F	28.1	13	(97)	107	3-10	F	28.1	1	71	210	5-4	M	33.5	18	60
9	3-0	M	29.3	10	(102)	120	4-0	M	29.3	23	82	211	5-6	F	31.3	82	95
42	3-2	M	30.7	7	91	122	4-6	M	32.1	69	89	212	5-0	M	27.3	75	90
43	3-8	M	34.8	73	90	123	4-7	F	27.8	71	102	213	5-4	F	51.7	82	86
46	3-7	M	29.0	37	85	124	4-1	M	27.3	62	92	214	5-6	M	27.8	55	95
47	3-0	F	27.8	0	77	125	4-2	F	29.7	81	98	215	5-3	M	27.8	63	72
70	3-3	M	29.0	6	82							216	5-0	M	29.3	48	94
72	3-8	M	44.2	59	96							217	5-3	M	27.0	82	100
73	3-3	M	37.1	8	77							218	5-2	F	49.6	72	96
74	3-2	F	29.7	13	88							219	5-2	F	29.2	72	104
75	3-6	F	28.2	97	105							220	5-3	F	27.8	69	103
76	3-3	M	27.8	7	100							221	5-3	F	39.5	66	71
77	3-7	M	29.3	10	83							230	4-11	M	28.1	91	103
78	3-9	M	29.0	25	90							231	4-11	F	27.8	25	91
79	3-3	F	27.8	0	75							232	5-5	F	27.5	43	98
80	3-2	F	27.8	53	112							233	5-0	F	32.1	48	81
81	3-3	F	28.1	1	68							234	5-6	F	31.7	32	95
82	3-0	F	27.8	0	79							235	5-5	F	27.3	41	90
												236	4-11	M	39.8	25	85
												238	5-0	M	37.1	28	72
												239	5-2	M	27.3	35	73
												242	4-10	F	39.5	89	99
												243	4-10	M	31.3	91	102
												244	5-7	M	29.4	89	108

Notes

CA = chronological age in years and months (i.e., 3 years, 2 months, etc.).

Binet scores in brackets (in Group A) were obtained at the beginning of the child's second year in preschool.

The score in brackets (in Group B) was obtained at the end of the subject's first year in preschool.

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Appendix C

SCHOOL ADJUSTMENT REPORT

Child's Name ______________ Teacher ____________________
School ____________________ Date ______________________

PLEASE COMMENT ON THE FOLLOWING:

1. How well has this child adjusted to your class? Please check in the appropriate box and then comment.
   below average ☐ average ☐ above average ☐

2. Are this child's attitudes toward school, teachers and school work positive? Please check in the appropriate box and then comment.
   below average ☐ average ☐ above average ☐

3. Was the child well prepared academically for the work of your class? Please check in the appropriate box and then comment indicating strengths and weaknesses.
   below average ☐ average ☐ above average ☐

4. Did this child need special remedial treatment or special help of any kind during this academic year?
   Yes ☐ No ☐ If yes, please describe:

5. How well has this child progressed academically during the current year? Please check and comment on changes in performance over the year.
   below average ☐ average ☐ above average ☐

6. Will the child be promoted to the next grade?
   Yes ☐ No ☐ If no, please explain why:

7. Has this child attended school regularly?
   Yes ☐ No ☐ If no, please explain:

8. What is your general appraisal of this child's personal and social competence?

9. What is your general appraisal of this child's academic competence?

10. Please provide any additional descriptions of this child's behavior which are particularly striking or characteristic, or any other relevant information.

Appendix D

BEHAVIOR RATING SCALE

Child #__________ School __________

Teacher __________ Date __________

Instructions:

Please rate how this child behaves by circling one of the four responses to each question.

	Very Much Like	Somewhat Like	Very Little Like	Not At All Like
1. Is usually carefree, rarely becomes frightened or apprehensive.	1	2	3	4
2. Talks eagerly to adults about his/her own experiences and what he/she thinks.	1	2	3	4
3. Often keeps aloof from others because he/she is uninterested, suspicious or bashful.	1	2	3	4
4. Tries to figure out things for himself/herself before asking adults or other children for help.	1	2	3	4
5. Has little respect for the rights of other children; refuses to wait for turn, takes toys other children are playing with, etc.	1	2	3	4
6. Seems disinterested in the general quality of his/her performance.	1	2	3	4
7. When faced with a difficult task, either does not attempt it or gives up very quickly.	1	2	3	4
8. Likes to talk or socialize with teach[illegible]	1	2	3	4
9. Is eager to inform other children of the experiences he/she has had.	1	2	3	4
10. Appears to trust in own abilities.	1	2	3	4

	Very Much Like	Somewhat Like	Very Little Like	Not At All Like
11. Responds to frustration or disappointment by becoming aggressive or enraged.	1	2	3	4
12. Is constricted, inhibited or timid; needs to be urged before engaging in activities.	1	2	3	4
13. Asks many questions for information about things, persons, etc. (Emphasis here should be on question prompted by genuine curiosity rather than bids for attention.)	1	2	3	4
14. Emotional response is customarily overstrong; over-responds to usual classroom problems, frustrations and difficulties.	1	2	3	4
15. Is lethargic or apathetic; has little energy or drive.	1	2	3	4
16. Is often quarrelsome with classmates for minor reasons.	1	2	3	4
17. Does not need attention or approval from adults to sustain him/her in work or play.	1	2	3	4
18. Has a tendency to discontinue activities after exerting a minimum of effort.	1	2	3	4
19. Goes about activities with a minimum of assistance from others.	1	2	3	4
20. Often will not engage in activities unless strongly encouraged.	1	2	3	4
21. Starts working on something before getting the directions straight.	1	2	3	4
22. Is responsive and friendly in relationships with the teachers in class (vs. cool or distant).	1	2	3	4

	Very Much Like	Somewhat Like	Very Little Like	Not At All Like
23. Looks to see how others are doing something before he/she does it (e.g., when teacher gives directions).	1	2	3	4
24. Quickly loses attention when teacher explains something to him/her.	1	2	3	4
25. Brings things to class that relate to current topics (e.g., collections, articles, etc.).	1	2	3	4
26. Appears to trust and like his/her teacher.	1	2	3	4
27. Sloppy in his/her work (e.g., products are dirty, marked up or wrinkled).	1	2	3	4
28. Relies on teacher for directions and to be told how to do things or proceed in class.	1	2	3	4
29. Seeks out the teacher before or after class to talk about school or personal matters.	1	2	3	4
30. Makes you doubt whether he/she is paying attention to what you are doing or saying (e.g., looks elsewhere, has blank stare).	1	2	3	4
31. Tells stories or describes things in an interesting or colorful fashion (e.g., has an active imagination).	1	2	3	4
32. Appears to like school.	1	2	3	4
33. Offers to do things for the teacher (e.g., erase the board, open the door, etc.).	1	2	3	4
34. Is unwilling to go back over and improve his/her work.	1	2	3	4
35. Cooperates with peers and works well in group projects.	1	2	3	4

	Very Much Like	Somewhat Like	Very Little Like	Not At All Like
36. Is unable to follow directions (e.g., needs precise directions before he/she can proceed successfully).	1	2	3	4
37. Is oblivious to what is going on in class (e.g., not "with it," seems to be in own "private" closed world).	1	2	3	4
38. Initiates classroom discussion.	1	2	3	4
39. Cooperates with the teacher and conforms to requirements (is easy to manage).	1	2	3	4
40. Rushes through his/her work and therefore makes unnecessary mistakes.	1	2	3	4
41. Likes to be close to the teacher (e.g., hug, touch, sit near, etc.).	1	2	3	4
42. Has difficulty deciding what to do when given a choice between two or more things.	1	2	3	4
43. Is able to apply what he/she has learned to a new situation.	1	2	3	4
44. Is difficult to reach (e.g., seems preoccupied with own thoughts, may have to call him/her by name to bring him/her out of himself/herself).	1	2	3	4
45. Introduces into class discussions personal experiences or things he/she has heard which relate to what is going on in class.	1	2	3	4
46. Is attractive and likeable.	1	2	3	4
47. Is swayed by the opinion of peers.	1	2	3	4
48. Is imaginative and offers novel ideas.	1	2	3	4
49. If reflective and usually thinks before he/she acts.	1	2	3	4
50. Appears to be well liked by peers.	1	2	3	4

BEHAVIOR RATING SCALE: SCORING DIMENSIONS BY ITEMS

Dimensions	Items
1. Aggression	5, 11, 14, 16
2. Verbal-Social Participation	2, 8, 9, 13
3. Timidity	1, 3, 12, 20
4. Independence	4, 10, 17, 19
5. Achievement Motivation	6, 7, 15, 18
6. Impatience	21, 27, 34, 40
7. External Reliance	23, 28, 36, 42, 47
8. Inattentive-Withdrawn	24, 30, 37, 44
9. Creative-Initiative	25, 31, 38, 45
10. Need for Closeness to Teacher	22, 29, 33, 41

Additional Items: 26, 32, 35, 39, 43, 46, 48, 49, 50.

11

Summative Evaluation: The Long-Term Impact—Results at the Post-Kindergarten Levels

SECOND YEAR IN SCHOOL (GRADE 1)

The subjects on whom either complete or partial data were obtained at this level were, in the fall and spring respectively, as follows:

	FALL	SPRING
Group A	24 (11 males, 13 females)	24 (11 males, 13 females)
Group B	12 (7 males, 5 females)	7 (4 males, 3 females)
Group C	23 (9 males, 14 females)	23 (9 males, 14 females)

The project terminated in the middle of the academic year in which the last cohort of Group B subjects (n = 5) was in Grade 1. The subjects in this cohort were, therefore, tested in the fall but not in the spring.

The groups at this level, as described above, were not significantly different by age or SES index, but they were poorly balanced for sex. The proportion of girls to boys was greater in Group C than in the other two groups (1.6 as compared with 1.2 in Group A and .7 in Group B).

This probably gave Group C an advantage over the other two groups because the failure rate in the primary grades generally has been found to be greater for boys than for girls.

Irregular attrition occurred at each assessment time particularly in the PG groups (i.e., one or another of the subjects was temporarily lost—absent from school and the whereabouts of his or her family unknown). Such a child was sometimes lost during one whole assessment period or only part of it. In the tabular presentations of results, the means shown are based on the scores of all of the subjects in each group who took the test, even though the subjects and the number of subjects varied somewhat from test to test and assessment time to assessment time. When, however, the data were subjected to statistical analysis and changes over time were assessed, only the data on the subjects who were tested in both the fall and the spring were included.

The data were subjected to a series of 3(Group) x 2(Time) ANOVAs and, when positive effects were found, to post-hoc analyses using Dunn's Multiple Comparisons Test (Kirk, 1968). The fall data obtained with the Stanford-Binet Intelligence Test and the Stanford Early School Achievement tests, which included scores on all 12 subjects in Group B rather than only 7 of them, were subjected also to one-way ANOVAs to explore for group effects when the Group B sample was larger.

Intellectual and Cognitive Competence

Stanford-Binet IQ (fall assessment). The two PG groups (A and B) maintained their preschool IQ gains and Group B maintained the additional gain it made in kindergarten. Group C also maintained its kindergarten gain. The mean Binet IQs of the three groups, at each preschool or primary grade level tested up to Grade 1, are shown in Table 17.

At the Grade 1 level, Group B scored 5 points higher than Group A. Their mean scores were 109 and 104, respectively. This difference was not statistically significant, but it was consistent with the difference found between these two groups at the end of kindergarten when their mean scores were 108 and 104, respectively.

Both of the two PG groups (A and B) had higher mean scores than Group C (Group A, $p < .05$; Group B, $p < .01$) at the Grade 1 level.

Circus "Say and Tell" (spring assessment only). On the functional language sub-test, there was a significant Group effect, $F(2,48) = 4.24$, $p < .01$. Group A (but not Group B) scored higher than

Group C ($p < .05$). However, on the other sub-tests in this measure, there were no statistically significant differences among the groups.

It is noteworthy that when judged against U.S. means, the functional language scores of all three groups were above average. The mean scores obtained on this test are presented in Table 18.

Circus "Think It Through" and "How Much and How Many" (spring assessment only). The trends suggested somewhat better overall performance for the two PG groups (A and B) than Group C on these cognitive measures, but the differences found only approached statistical significance on Part II of "How Much and How Many" (Mathematical Concepts and Conservation), $F(2,49) = 3.16$, $p < .06$. On this measure Group B (but not Group A) scored somewhat higher than Group C. However, when judged against U.S. norms, the mean scores of the two PG groups (A and B) were average or above average on four sub-tests (in Group A) and all five sub-tests (in Group B), but the scores of Group C were average on only one of the sub-tests. The mean scores obtained on these tests are presented in Table 19.

KRISP. In the fall, 88% of the subjects in Group A, 71% in Group B and 78% in Group C performed satisfactorily on this test and in the spring, 100% of Group A, 100% of Group B and 86% of Group C performed satisfactorily. At this level the KRISP appeared to be easy for most of the subjects and these results may have, at least in part, reflected ceiling effects.

Summary. At this level, the intellectual functioning of the two PG groups (A and B) was, as measured by their Binet IQs, superior to that of Group C. Their cognitive competence, as assessed by Circus "Think It Through" and "How Much and How Many," appeared to be little different from that of Group C when statistical measures of the significance of the differences were applied. However, when judged against available normative data for children in the United States, their performance was generally average or above average while that of Group C was generally below average. On the language test, Circus "Say and Tell," although Group A scored higher than the other two groups on functional language, all three groups performed at an above-average level when judged against American norms.

Academic Achievement

Stanford Early School Achievement Test, Level II. The mean scores of the groups on this battery of tests are presented in Table 20.

The one-way ANOVAs on the fall data, when the number of subjects in Group B was 12, yielded significant group effects for

Table 17

Mean and (SD) Binet IQs of the Groups at Each Assessment Time from Entry into the Project Until the Beginning of Grade 1

	Preschool age 3-4 years						*Preschool age 4-5 years*						*Kindergarten age 5-6 years*						*Grade 1 age 6*		
	Fall			*Spring*			*Fall*			*Spring*			*Fall*			*Spring*			*Fall*		
	n	x	*SD*	n	x	*SD*	n	x	*SD*	n	x	*SD*	n	x	*SD*	n	x	*SD*	n	x	*SD*
Group A	16	87	(11.7)	16	97	(11.4)	24	95	(13.8)	23	103	(10.1)	23	103	(10.2)	23	104	11.3	24	104	11.7
Group B							11	93	(11.8)	12	101	(11.5)	12	104	(9.0)	12	108	8.3	12	109	14.2
Group C													24	91	(11.0)	24	95	11.3	23	96	1.7

Table 18

Mean and (SD) Circus "Say and Tell" Form B Scores of Each Group at the End of Grade 1

Section of Test	*GROUP A (n = 22)*	*GROUP B (n = 6)*	*GROUP C (n = 23)*	*U.S. National Means*
Part I Description				
Pencil A responses	7.6 (0.7)	7.7 (0.5)	7.2 (0.7)	7.0 (1.4)
Dollar A responses	2.7 (0.8)	2.8 (1.0)	2.7 (0.7)	3.8 (1.8)
Part II Functional Language				
Total A responses	21.7 (4.8)	18.0 (3.1)	18.4 (3.4)	14.1 (3.7)
Part III Narration				
Number of words	104.7 (54.9)	88.0 (25.2)	86.6 (29.7)	56.6 (34.7)
Number of different words	63.9 (24.7)	40.3 (9.5)	40.1 (14.2)	
Ratio of different words to total words	.5 (0.1)	.5 (.0)	.5 (.1)	.5 (.1)
Ratio of different situations to total words	.5 (.1)	.2 (.0)	.2 (.1)	.2 (.1)
Number of external events	3.9 (4.4)	1.7 (1.5)	2.1 (1.8)	1.4 (3.1)

Table 19

Mean and (SD) Circus "Think It Through" and "How Much and How Many" Form B Scores of the Groups at the End of Grade 1

Measure	*GROUP A (n = 23)*		*GROUP B (n = 6)*		*GROUP C (n = 23)*		*U.S. National Means*	
"Think It Through"								
Word problems (classification)	11.9	(1.2)	11.5	(0.84)	10.04	(3.9)	11.1	(1.05)
Patterns (deducing and applying rules)	5.8	(2.4)	7.2	(1.2)	5.74	(2.0)	5.62	(1.19)
Mazes (selecting shortest path to goal)	5.3	(1.4)	6.3	(0.8)	5.04	(1.4)	5.49	(0.63)
"How Much and How Many"								
Part I (counting, numerical concepts, adding, subtracting)	25.3	(5.2)	27.5	(4.8)	23.13	(3.8)	24.5	(4.2)
Part II (mathematical concepts and conservation)	19.9	(4.0)	22.0	(2.3)	18.04	(3.7)	18.3	(2.7)

Mathematics, Letters and Sounds, and Aural Comprehension, but not for Environment or Word Reading (and Sentence Reading was not tested in the fall) as follows:

> *Mathematics*, $F(2,56) = 8.9$, $p < .01$. The difference between the two PG groups (A & B) was not significant, but both scored higher than Group C ($p < .05$ and $p < .01$, respectively).
>
> *Letters and Sounds*, $F(2,56) = 6.9$, $p < .01$. The difference between the two PG groups (A & B) was not significant, but both scored higher than Group C (both $p < .05$).
>
> *Aural Comprehension*, $F(2,56) = 11.4$, $p < .01$. The difference between the two PG groups (A & B) was not significant, but both scored higher than Group C (both $p < .01$).

The 3(Group) x 2(Time) ANOVAs on the fall and spring data, with the number of subjects in Group B only 7, yielded the following results:

> *Environment.* There was a significant group effect, $F(2,49) = 6.7$, $p < .01$. In the fall the differences among the groups were not large enough to be significant. There was, however, a significant Time effect, $F(1,49) = 52.1$, $p < .01$. Group A and Group C (but not Group B) made significant gains (both $p < .01$). In the spring, although the difference between the two PG groups (A and B) was not significant, Group A (but not Group B) scored significantly higher than Group C ($p < .01$). As judged against U.S. means, in both the fall and the spring, the performance of the two PG groups (A and B) was average, but the performance of Group C was below average.

Table 20

Mean and (SD) Stanford Early School Achievement, Level II Scores of the Groups at the Beginning and End of Grade 1

	GROUP A		*GROUP B*		*GROUP C*	
Test	*Fall (n = 24)*	*Spring (n = 22)*	*Fall (n = 12)*	*Spring (n =7)*	*Fall (n = 23)*	*Spring (n = 23)*
Environment	22.3 (5.6)	27.1 (4.7)	23.1 (4.9)	25.6 (2.9)	19.3 (3.5)	22.0 (3.6)
Mathematics	27.8 (10.1)	40.7 (10.1)	33.4 (10.8)	46.7 (8.2)	20.7 (5.6)	36.7 (8.7)
Letters and Sounds	28.5 (7.3)	36.3 (3.9)	30.1 (6.1)	38.3 (2.4)	21.8 (8.5)	33.7 (5.6)
Aural Comprehension	17.9 (2.9)	19.0 (3.3)	17.2 (4.0)	19.4 (2.0)	13.4 (3.4)	17.0 (3.9)
Word Reading	25.7 (11.7)	49.3 (7.6)	26.6 (6.2)	49.9 (6.3)	20.9 (9.5)	42.5 (11.5)
Sentence Reading		18.8 (12.3)		14.0 (8.1)		13.1 (11.8)
Total Score		191.1 (31.7)		193.9 (18.5)		164.9 (35.7)

Note:

U.S. norms: Range of scores in Stanine 5 indicating average performance

	(beginning of grade)	*(end of grade)*
Environment	23-25	25-27
Mathematics	29-33	43-46
Letters & Sounds	28-32	37-38
Aural Comprehension	16-17	19-20
Word Reading	23-28	49-53
Sentence Reading	—	18-25
Total Score	—	190-209

Mathematics. There was a significant Group effect, $F(2,49) = 6.3$, $p < .01$. In the fall the difference between the two PG groups (A and B) was not significant, but Group B (although not Group A) scored higher than Group C ($p < .05$). There was a significant Time effect, $F(1,49) = 156.4$, $p < .01$. All three groups made significant gains ($p < .01$). In the spring there were no statistically significant differences among the groups. However, as judged against U.S. norms, in the fall the scores of the two PG groups (A and B) were average and the score of Group C was below average, and in the spring the score of Group B was high average, but at this time Group A as well as Group C scored below average.

Letters and Sounds. There was a significant Group effect, $F(2,49) = 7.5$, $p < .01$. In the fall, the difference between the two PG groups (A and B) was not significant, but both of these groups scored higher than Group C (both $p < .01$). There was a significant Time effect, $F(1,49) = 93.3$, $p < .01$ and a significant Group x Time Interaction effect, $F(2,49) = 3.14$, $p < .05$. Groups A and C, but not Group B, made significant gains (both $p < .01$). In the spring, there were no statistically significant differences among the groups. However, as judged against U.S. norms, in the fall the performance of the two PG groups (A and B) was average, but Group C was below average and, in the spring, the performance of Group B was still average, Group A was slightly below average, but Group C was well below average.

Aural Comprehension. There was a significant Group effect, $F(2,49) = 7.8$, $p < .01$. In the fall, the difference between the two PG groups (A and B) was not significant, but Group A (although not Group B) scored higher than Group C ($p < .01$). There was a significant Time effect, $F(1,49) = 20.4$, $p < .01$. Group C (but not A or B) made a significant gain, $p < .01$. In the spring, there were no statistically significant differences among the groups. However, as judged by U.S. norms, in both the fall and the spring, the performance of the two PG groups (A and B) was average and that of Group C was below average.

Sentence Reading. This test was given only in the spring. A one-way ANOVA on the results revealed no significant differences among the groups. However, as judged against U.S. norms, the performance of Group A was average, but that of both the B and C groups was below average.

Total score. A one-way ANOVA of the spring total scores, which included Sentence Reading, yielded a main effect for Group, $F(2,49) = 4.45$, $p < .05$. There was no statistically significant difference between the two PG groups (A and B), or between the B and C groups, but Group A scored higher than Group C ($p < .05$). Also, when judged against U.S. norms, the performance of the two PG groups was average, but that of Group C was below average.

Summary. The differences between the two PG groups and Group C found in the fall appeared to have been substantially reduced by the end of the school year. However, when the spring performance of the A and B groups was judged against available normative data, it was, on the whole, average while that of Group C was below average.

School Adjustment Reports. The percentages of subjects assigned to each judgment category in these reports, are shown by group in Table 21. No reports were submitted on five subjects (three in Group A and one in each of the B and C groups), but information about promotion to the next grade (pass/fail) was otherwise obtained on three of them (two in Group A and one in Group B). Also in the submitted reports, some questions were not answered. In the table the number of subjects on whom information was obtained is, therefore, shown by item.

1. *Academic Competence (item 9).* Of the PGs who were judged on this item, almost half of those in Group A (47%) were considered above average, 42% average and 11% below average. In Group B, all were considered average and none below average and, in Group C, although 14% were considered above average and 59% average, 27% were considered below average.
2. *Academic Preparation (item 3).* Somewhat more of the Group A (71%) than the Group B (60%) or Group C (63%) subjects were considered above average or average in preparation for the work of Grade 1.
3. *Remedial Instruction (item 5).* Proportionately fewer of the Group A (24%) than the Group B (67%) or Group C (46%) subjects required remedial academic instruction.
4. *Promotion and Failure Rate (item 7).* Twenty of the 23 subjects in Group A (87%), six of the seven subjects in Group B (86%) and 17 of the 22 subjects in Group C (77%) were promoted to the next grade. The failure rate was, therefore, 13%, 14% and 23% in Groups A, B and C respectively.
5. *Failures and Sex.* Of the nine children (all groups combined) who were not promoted, more were boys (n = 7) than girls (n = 2).
6. *Failures and Regularity of Attendance at School.* Poor attendance at school appeared to be related to failures among the boys (in five of the seven cases), but not the girls. In the PG groups, all three of the boys who failed (two in A, one in B) had poor attendance records and in two cases the teachers stated that these boys had been in school less than half of the time. Both of these children were said to have average or better ability and to be capable of doing Grade 1 work (and this was confirmed by their test scores), but they had not had time to develop the academic skills needed for progression to the next grade.

Table 21

Percentage of Subjects Assigned to Each Judgment Category of the School Adjustment Report by Group at the End of Their Second Year in School

1. How well has this child adjusted to your class?				
Group A	42.9 above average	47.6 average	9.5 below average	(n = 21)
Group B	0 above average	100.0 average	0 below average	(n = 6)
Group C	9.1 above average	68.2 average	22.7 below average	(n = 22)
2. Are this child's attitudes toward school, teachers and school work positive?				
Group A	42.9 above average	38.1 average	19 below average	(n = 21)
Group B	0 above average	83.3 average	16.6 below average	(n = 6)
Group C	18.2 above average	81.8 average	0 below average	(n = 22)
3. Was this child well prepared academically for the work of your class?				
Group A	19.0 above average	52.4 average	28.6 below average	(n = 21)
Group B	0 above average	50.0 average	50.0 below average	(n = 6)
Group C	4.3 above average	59.1 average	36.4 below average	(n = 22)
4. How well has this child progressed academically during the current year?				
Group A	33.3 above average	38.1 average	28.6 below average	(n = 21)
Group B	0 above average	33.3 average	66.6 below average	(n = 6)
Group C	13.6 above average	63.6 average	22.7 below average	(n = 22)
5. Did this child need remedial help?				
Group A	NO 76.2	YES 23.8		(n = 21)
Group B	NO 33.3	YES 66.6		(n = 6)
Group C	NO 54.5	YES 45.5		(n = 22)
6. Did this child attend school regularly?				
Group A	YES 85.7	NO 14.3		(n = 21)
Group B	YES 66.6	NO 33.3		(n = 6)
Group C	YES 90.9	NO 9.1		(n = 22)
7. Was this child promoted to the next grade?				
Group A	YES 87.0	NO 13.0		(n = 23)
Group B	YES 85.7	NO 14.3		(n = 7)
Group C	YES 77.3	NO 22.7		(n = 22)
8. What is your general appraisal of this child's personal and social adjustment?				
Group A	75.0 satisfactory	20.0 some concern	5.0 poor	(n = 20)
Group B	80.0 satisfactory	20.0 some concern	0 poor	(n = 5)
Group C	40.9 satisfactory	36.4 some concern	22.7 poor	(n = 22)
9. What is your general appraisal of this child's academic competence?				
Group A	47.4 above average	42.1 average	10.5 below average	(n = 19)
Group B	0 above average	100.0 average	0 below average	(n = 5)
Group C	13.6 above average	59.1 average	27.3 below average	(n = 22)

Summary. The teachers again (as at the kindergarten level) judged Group A more favorably than Group B in academic competence even though, as measured by the academic achievement tests, Group B was achieving about as well as Group A. Also Group B was generally judged no more favorably than Group C even though Group B's overall performance on the achievement tests was generally average while that of Group C was below average.

Personal-Social Adjustment

School Adjustment Reports. The information obtained from the teachers' reports on social and personal adjustment was reported along with the information obtained on academic competence in Table 21. The findings were as follows:

1. *General Personal and Social Adjustment (item 8).* More of the PG subjects in both the A and B groups (75% and 80%, respectively) than in Group C (41%) were considered to be satisfactorily adjusted.
2. *Adjustment to the Class (item 1).* More of the Group A (43%) than the Group B (0%) or Group C (9%) subjects were said to have adjusted to the class in an above-average way.
3. *Attitudes toward School (item 2).* More of the Group A (43%) than the Group B (0%) or Group C (18%) subjects were said to have positive attitudes toward school which were above average.

Summary. Here again the teachers' judgments favored the Group A subjects over those in the other two groups.

Behavior Rating Scale. There were no significant differences among the groups on any of the dimensions assessed by this measure. The mean scores obtained by each group are presented in Table 22.

THIRD YEAR IN SCHOOL (GRADE 2 OR GRADE 1 REPEATED)

The subjects on whom either complete or partial data were obtained at this level were, in the fall and spring respectively, as follows:

	FALL	SPRING
Group A	22 (10 boys, 12 girls)	11 (5 boys, 6 girls)
Group B	2 (2 boys, 0 girls)	2 (2 boys, 0 girls)
Group C	16 (6 boys, 10 girls)	16 (6 boys, 10 girls)

The project terminated in the middle of the academic year in which the subjects in the third cohort of Group A were at this level. Therefore only fall test data were obtained on them.

The groups, as described above, were not significantly different by age or SES index, but they were poorly balanced for sex. There were proportionately more girls and fewer boys in Group C than in the PG groups (A and B). In Group B there were only two boys. Because of the size of Group B, no statistical analyses of the differences between this

Table 22

Mean and (SD) Behavior Rating Scale Scores of the Groups at the End of Their Second Year in School

Dimension	*GROUP A (n = 21)*	*GROUP B (n = 6)*	*GROUP C (n = 22)*
1. Aggression[1]	12.4 (3.4)	11.2 (4.0)	12.9 (3.7)
2. Verbal-Social Interaction	12.9 (3.2)	10.3 (3.1)	12.2 (3.0)
3. Timidity[1]	12.6 (3.2)	12.6[3] (2.1)	12.5 (3.1)
4. Independence	11.7 (3.2)	11.2[3] (1.8)	11.3 (3.5)
5. Achievement Motivation	11.2 (3.6)	10.2 (3.5)	12.4 (3.2)
6. Impatience[1]	11.9[3] (3.0)	9.3 (3.3)	11.3 (3.0)
7. External Reliance[1]	13.1[3] (3.4)	14.4[3] (1.5)	12.3 (4.0)
8. Inattentive-Withdrawn[1]	11.7[3] (4.2)	12.3 (2.7)	12.9 (3.5)
9. Creative-Initiative	10.4[3] (3.7)	9.2 (4.2)	8.8 (3.6)
10. Need for Closeness	11.9[3] (3.4)	11.0 (3.0)	12.3 (2.9)
Total (all dimensions)	119.9[3] (26.8)	114.7[3] (20.3)	118.7 (24.9)
Ambition[2]	35.6[3] (8.1)	35.0[3] (6.3)	35.7 (8.7)

Notes:

[1] For Aggression, Timidity, Impatience, External Reliance and Inattentive-Withdrawn, higher scores indicate *less* of the behavior.

[2] "Ambition" is a combined score on Timidity, Independence and Achievement Motivation.

[3] Responses to some items were not given. Thus, the number of scores on which the mean for this dimension was based was 20 or (in two cases) 19 in Group A and 5 in Group B.

and the other groups were made. The scores of Group B are, however, reported in the tables.

As at the Grade 1 level, irregular attrition occurred at each assessment time (i.e., one or other of the subjects was temporarily lost). Hence the number of subjects on which the results are based varies somewhat from test to test.

Intellectual Competence

Stanford-Binet IQ (fall assessment). The two PG groups (A and B) continued to maintain their preschool IQ gains. In Group A the mean IQ of the 21 subjects tested was 104.2 (*SD* 13.0). At the end of preschool the mean IQ of this sample of Group A subjects was 101.8 (*SD* 12.2). In Group B the mean IQ of the two subjects was 103. At the end of preschool it was 102. Thus, there was no evidence of decline in the IQs of the PG groups.

In Group C the mean IQ of the 16 subjects tested was 94.2 (*SD* 8.7), just about the same as it was for this sample of Group C subjects at the end of kindergarten (93.8, *SD* 12.0).

Academic Achievement

Stanford Achievement Test, Primary I Battery (fall assessment). The data on Group A and Group C (but not B) were subjected to a series of one-way ANOVAs to explore for group effects and it was found that the mean scores of Group A were significantly higher than those of Group C on all but one (Word Meaning) of the tests. The mean scores of the groups are presented in Table 23. The $F\,(1,35)$ values for the measures which differentiated the A and C groups and their significance levels were as follows:

Paragraph Meaning	6.42	$p < .05$
Vocabulary	6.31	$p < .05$
Spelling	6.52	$p < .05$
Word Study Skills	6.70	$p < .05$
Arithmetic	5.12	$p < .05$

As judged against U.S. norms the performance of Group A was average or above average on three of the six tests (Vocabulary, Word Study Skills and Arithmetic), but the performance of Group C was below average on all six measures. Group B performed at an average level on two of the tests (Arithmetic and Spelling) but below average on the other measures.

Stanford Achievement Test, Primary II Battery (spring assessment). The data on Group A and Group C (but not B) were subjected to a series of one-way ANOVAs to explore for group effects and it was found that the mean scores of Group A were significantly higher than those of Group C on five of the eight tests. The mean scores of the groups are presented in Table 24. The $F\,(1,23)$ values for the measures which differentiated the A and C groups and their significance levels were as follows:

Word Meaning	12.36	$p < .01$
Paragraph Meaning	7.78	$p < .01$
Science and Social Studies	6.43	$p < .05$
Word Study Skills	7.30	$p < .05$
Language	11.19	$p < .01$

As judged against U.S. norms, the performance of Group A was average on Word Study Skills and Spelling, but somewhat below average on all of the other tests. The performance of Group C was, however, well below average on all of the tests. The one Group B subject tested at this time performed at an average level on three of the tests (Paragraph Meaning, Spelling and Word Study Skills), but somewhat below average on the others.

School Adjustment Reports. A summary of the teachers' judgments of the academic competence and progress of the subjects

Table 23

Mean and (SD) Stanford Achievement Test Primary I Battery Grade Scores of the Groups at the Beginning of Their Third Year in School

Test	*GROUP A*		*GROUP B*		*GROUP C*	
	(n = 21)		*(n = 2)*		*(n = 16)*	
	X	*SD*	X	*SD*	X	*SD*
Word Reading	19.7	(6.6)	16.5	(.7)	15.6	(7.0)
Paragraph Meaning	18.9	(8.9)	15.5	(2.1)	11.6	(8.39)
Vocabulary	21.3	(7.1)	22.0	(1.4)	16.4	(3.3)
Spelling	18.7	(6.9)	18.5	(3.5)	11.69	(9.7)
Word Study Skills	24.5	(10.4)	19.0	(4.2)	16.9	(5.87)
Arithmetic	20.3	(5.1)	20.5	(6.4)	16.6	(6.76)

Note:
The range of scores reflecting average performance, based on U.S. norms, is 20-22 for each test.

Table 24

Mean and (SD) Stanford Achievement Test Primary II Battery Grade Scores of the Groups at the End of Their Third Year in School

Test	*GROUP A*		*GROUP B*		*GROUP C*	
	(n = 10)		*(n = 1)*		*(n = 15)*	
	X	*SD*	X	*SD*	X	*SD*
Word Meaning	27.9	(5.3)		21	18.07	(7.7)
Paragraph Meaning	24.4	(5.8)		29	14.3	(10.3)
Science and Social Studies	25.1	(8.2)		26	18.67	(4.5)
Spelling	28.8	(5.2)		30	21.8	(12.8)
Word Study Skills	33.9	(14.7)		29	20.7	(9.9)
Language	26.4	(7.6)		22	12.5	(11.6)
Arithmetic Computation	23.0	(10.3)		26	19.3	(6.1)
Arithmetic Concepts	20.8	(4.9)		19	16.6	(5.6)

Note:
Range of scores representing average performance, based on U.S. norms:

Word Meaning	28-30
Paragraph Meaning	27-30
Science and Social Studies	27-31
Spelling	26-31
Word Study Skills	27-33
Language	27-30
Arithmetic Computation	28-30
Arithmetic Concepts	27-31

during their third year in school is presented in Table 25. It should be noted that reports were obtained on only eight of the 11 Group A subjects and on only 15 of the 16 Group C subjects. Also, no answers were given to some of the items in the reports obtained on the Group C subjects. Information about promotion to the next grade (pass/fail data) was, however, otherwise obtained on all of the subjects in all of the groups. The findings were as follows:

1. *General Academic Competence (item 9).* In Group A half of the subjects on which reports were obtained were considered above average. The other half were considered average. In Group B both subjects were considered average. Thus, none of the PGs was considered below average. In contrast, in Group C no subject was considered above average, 62% were considered average, but 38% were considered below average.
2. *Academic Preparation (item 3).* In Group A 37.5% of the children were considered above average, 50% average and 12.5% below average. In Group B one subject was considered average and the other below average. In Group C no subject was judged to be above average, 53% were considered average and 47% below average.
3. *Special Remedial Instruction (item 5).* In Group A only 25% of the subjects were given special instruction as compared with 67% of Group C. In Group B one subject received special instruction but the other did not.
4. *Promotion (item 7).* In the two PG groups (A and B) all of the subjects (100%) were promoted, as compared with only 69% in Group C. In Group C five children failed (31% of the group), three who were in the second grade (two girls and one boy) and two who were repeating first grade (both boys).

Personal-Social Adjustment

School Adjustment Reports. The percentage of subjects in each group who were assigned to each of the judgment categories in the personal-social adjustment area were shown in Table 25. The findings were as follows:

1. *General Personal and Social Competence (item 8).* There were no apparent differences between Groups A and C in this area as judged by the teachers.
2. *Adjustment to Class (item 1).* A somewhat larger proportion of Group A than Group C subjects were considered to have adjusted to the class in an above-average way and somewhat fewer to have adjusted in a below-average way.

Table 25

Percentage of Subjects Assigned to Each Judgment Category of the School Adjustment Report by Group at the End of Their Third Year in School

1. How well has this child adjusted to your class?				
Group A	50 above average	37.5 average	12.5 below average	(n = 8)
Group B	0 above average	100 average	0 below average	(n = 2)
Group C	21.4 above average	57.1 average	21.4 below average	(n = 14)
2. Are this child's attitudes toward school, teachers and school work positive?				
Group A	25 above average	62.5 average	12.5 below average	(n = 8)
Group B	0 above average	50.0 average	50.0 below average	(n = 2)
Group C	33.3 above average	46.7 average	20.0 below average	(n = 15)
3. Was this child well prepared academically for the work of your class?				
Group A	37.5 above average	50 average	12.5 below average	(n = 8)
Group B	0 above average	50 average	50 below average	(n = 2)
Group C	0 above average	53.3 average	46.7 below average	(n = 15)
4. How well has this child progressed academically during the current year?				
Group A	25.0 above average	75.0 average	0 below average	(n = 8)
Group B	0 above average	50.0 average	50.0 below average	(n = 2)
Group C	6.7 above average	73.3 average	20.0 below average	(n = 15)
5. Did this child need remedial help?				
Group A	75.0 NO	25.0 YES		(n = 8)
Group B	50.0 NO	50.0 YES		(n = 2)
Group C	33.3 NO	66.7 YES		(n = 15)
6. Did this child attend school regularly?				
Group A	87.5 YES	12.5 NO		(n = 8)
Group B	100.0 YES	0 NO		(n = 2)
Group C	100.0 YES	0 NO		(n = 15)
7. Was this child promoted to the next grade?				
Group A	100.0 YES	0 NO		(n = 11)
Group B	100.0 YES	0 NO		(n = 2)
Group C	68.8 YES	31.3 NO		(n = 16)
8. What is your general appraisal of this child's personal and social competence?				
Group A	62.5 satisfactory	25.0 some concern	12.5 poor	(n = 8)
Group B	100.0 satisfactory	0 some concern	0 poor	(n = 2)
Group C	64.3 satisfactory	21.4 some concern	14.3 poor	(n = 14)
9. What is your general appraisal of this child's academic competence?				
Group A	50.0 above average	50.0 average	0 below average	(n = 8)
Group B	0 above average	100.0 average	0 below average	(n = 2)
Group C	0 above average	61.5 average	38.5 below average	(n = 13)

3. *Attitude Toward School (item 2).* There appeared to be no marked differences between Groups A and C in their attitudes toward school, as judged by the teachers.

Behavior Rating Scale. There were no significant differences between Groups A and C on any of the dimensions assessed by this rating scale. The mean scores of the groups on each dimension assessed are presented in Table 26.

Table 26

Mean and (SD) Behavior Rating Scale Scores for Groups A, B and C at the End of Their Third Year in School

Dimension	*GROUP A (n = 8)*	*GROUP B (n = 2)*	*GROUP C (n = 15)*
1. Aggression[1]	13.1 (2.2)	11.0 (5.6)	13.1 (3.3)
2. Verbal-Social Interaction	11.8 (3.77)	10.0 (0)	11.5 (3.[illegible])
3. Timidity[1]	11.1 (3.6)	12.0 (4.2)	11.7 (4.1)
4. Independence	11.4 (4.69)	11.5 (3.5)	10.0 (3.2)
5. Achievement Motivation	12.4 (3.07)	7.0 (0)	10.9 (2.6)
6. Impatience[1]	12.1 (3.87)	10.0 (1.4)	12.6 (2.9)
7. External Reliance[1]	13.1 (4.26)	8.5 (.7)	11.9 (3.2)
8. Inattentive-Withdrawn[1]	11.4 (3.46)	10.5 (.7)	11.2 (3.4)
9. Creative-Initiative	10.5 (4.17)	5.0 (1.4)	10.0 (4.4)
10. Need for Closeness	11.5 (3.1)	7.5 (.7)	12.5 (3.2)
Total	118.4 (30.0)	93.0 (8.5)	115.5 (22.9)
Ambition[2]	34.9 (9.7)	30.5 (.7)	32.6 (7.9)

Notes:

[1] For Aggression, Timidity, Impatience, External Reliance, Inattentive-Withdrawn, higher scores indicate *less* of the behavior.

[2] "Ambition" is a combined score on Timidity, Independence and Achievement Motivation.

FOURTH YEAR IN SCHOOL (GRADE 3 OR BELOW)

The subjects on whom either complete or partial data were obtained at this level were as follows:

	FALL	SPRING
Group A	7 (2 males, 5 females)	7 (2 males, 5 females)
Group B	2 (2 males)	1 (1 male)
Group C	5 (1 male, 4 females)	5 (1 male, 4 females)

Intellectual Competence

Stanford-Binet IQs (fall assessment). Scores on this measure were obtained on all subjects as described above. The mean scores of the groups were, for A, B and C respectively, 105.2, (*SD* 12.2), 110.5 and 90.2 (*SD* 6.2).

The PG groups (A and B) were still maintaining their preschool IQ gains. At the end of preschool their mean scores were, for the seven Group A subjects, 106.9 (*SD* 12.6) and, for the two Group B subjects, 101.5.

In the Control group the trend was toward somewhat less satisfactory performance than that displayed at the kindergarten level. The mean scores of the five Group C subjects at the beginning and end of kindergarten were 91.8 (*SD* 9.4) and 95.0 (*SD* 7.7) respectively.

Academic Achievement

The Stanford Achievement Test, Primary II Battery was administered in both the fall and the spring. It was given to all of the subjects in the A and C groups as described above, but to only one of the Group B subjects at only one assessment time (fall). The mean scores of Groups A and C and the scores of the one subject tested in Group B are presented in Table 27.

Because the samples were so small at this level, statistical analysis of the data obtained on them was probably inappropriate. Only very large differences could be expected to be statistically significant. A series of 2 (Group) x 2 (Time) ANOVAs were, however, performed on the scores of the A and C groups. It was found that although Group A scored higher than Group C on all of the tests, the differences were large enough to be statistically significant on only Word Meaning and Paragraph Meaning. There were significant main effects for Time, but no interaction effects, on all of the tests except Science and Social Studies (i.e., both groups made significant gains from fall to spring and the sizes of these gains were not significantly different). The fact that neither group made significant gains on the Science and Social Studies test suggests that what was measured by this test may not have been emphasized at this primary grade level in the London public schools.

As judged against U.S. norms (range of scores in Stanine 5 representing average performance, as shown in Table 27) in the fall, Group A scored above average on Word Study Skills and average on four other tests (Word Meaning, Paragraph Meaning, Spelling and Language), but somewhat below average on three measures (Science and Social Studies, Arithmetic Computation and Arithmetic Concepts). The one subject in Group B scored above average on Arithmetic Computation, average on five other tests and below average on only two (Science and Social Studies, and Arithmetic Concepts). In contrast, Group C scored below average on all eight tests, well below average on all of them except Word Study Skills.

In the spring, Group A was still scoring above average on one test (Word Study Skills), average on three tests (Paragraph Meaning, Language and, at this time, Arithmetic Concepts), but somewhat below average on four tests (Word Meaning, Spelling, Science and Social Studies, and Arithmetic Computation). Group C scored average on one test (Word Study Skills), but continued to score well below average on all of the other seven tests.

Teachers' judgments of academic competence. School adjustment reports were obtained on only six of the seven subjects in Group A and four of the five subjects in Group C. Information about promotion (pass/fail data) was, however, otherwise obtained on all of the subjects. Before considering the data derived from these reports, it

Table 27

Mean and (SD) Stanford Achievement Test Primary II Battery Grade Scores of the Groups at the Beginning and End of Their Fourth Year in School

	GROUP A		*GROUP B*		*GROUP C*	
Test	*Fall* *n* = 7	*Spring* *n* = 7	*Fall* *n* = 1	*Spring* *n* = 0	*Fall* *n* = 5	*Spring* *n* = 5
Word Meaning	30.7 (6.8)	33.0 (3.8)	30		17.8 (10.6)	24.4 (4.7)
Paragraph Meaning	30.6 (5.8)	37.1 (5.5)	31		17.0 (10.9)	25.6 (7.4)
Science and Social Studies	26.6 (7.8)	30.0 (8.9)	26		19.2 (4.8)	24.4 (10.8)
Spelling	29.0 (6.7)	36.1 (5.6)	30		23.8 (5.2)	30.2 (8.04)
Word Study Skills	39.9 (20.2)	48.0 (18.3)	31		26.0 (12.6)	37.2 (13.5)
Language	30.3 (12.2)	38.7 (7.9)	32		18.2 (10.6)	31.2 (12.4)
Arithmetic Computation	27.6 (4.6)	34.7 (5.2)	35		22.4 (7.1)	29.0 (9.1)
Arithmetic Concepts	25.7 (6.2)	35.0 (10.0)	27		20.2 (7.4)	23.2 (6.6)

Note:

U.S. norms: Range of scores in Stanine 5 indicating average performance.

	(beginning of year)	*(end of year)*
Word Meaning	29-33	37-40
Paragraph Meaning	30-33	36-41
Science and Social Studies	29-33	36-40
Spelling	29-32	37-40
Word Study Skills	28-35	33-45
Language	29-32	36-42
Arithmetic Computation	30-32	37-40
Arithmetic Concepts	29-33	34-41

should be pointed out that all of the PGs were at grade level (Grade 3), but two of the Control subjects were one year below grade level (i.e., in Grade 2). The findings were as follows:

1. *General Academic Competence (item 9).* In Group A, three of the six subjects on whom reports were obtained were judged to be above average and the other three average. In Group C, three of the four subjects on whom reports were obtained were considered average and the other one below average.
2. *Preparation for the Work of the Class (item 3).* In Group A, three were considered above average, two average and one below average. In Group C, two were considered average and two below average.
3. *Special Remedial Help (item 5).* In both Groups A and C half of the subjects received remedial help.
4. *Promotion (item 7).* All of the subjects (seven in Group A, two in Group B and five in Group C) were promoted.

Personal-Social Adjustment

School Adjustment Reports. The information derived from these reports about the children's social and personal adjustment can be summarized as follows:

1. *General Personal and Social Competence (item 8).* In Group A the competence of five of the six children was considered satisfactory and concern was expressed about only one subject. In Group C two children were judged satisfactory, concern was expressed about one and the competence of the fourth child was considered to be poor.
2. *Adjustment to the Class (item 1) and Attitudes Toward School, Teachers and School Work (item 2).* These were considered above average or average for all subjects in both Groups A and C. No subject in either group was considered below average.

School Behavior Rating Scale. There were no statistically significant differences between these two small groups (A and C) on any of the dimensions assessed by this measure.

FIFTH YEAR IN SCHOOL (GRADE 4)

Only one subject was available for study at this level. This was a PG Group B male subject who had attended the preschool for one year during the first year of the project.

A limited amount of data was obtained on this subject. He was given the Stanford-Binet in the fall, but then became unavailable for further testing. At the beginning of Grade 4 this child's IQ was slightly above average, the same as it was at the end of preschool. However, because of absenteeism, he was performing academically at a low-average level, especially in reading. During Grade 4 he was given treatment and special remedial instruction in a residential school, but when he returned to the public school in the spring he was not promoted to Grade 5.

ALL LEVELS: PASS/FAIL AND FINAL GRADE LEVELS

Pass/fail data were obtained on the subjects both at the end of the academic year in which the project was terminated and again at the end of the next year. Therefore, on this variable, information in addition to that already reported was obtained.

Pass/Fail (Promotion/Denied Promotion)

Pass/fail rates were calculated on the basis of achievement at only the post-kindergarten levels, because no subject in any group failed kindergarten. The failure rate for each group was calculated as a percentage, using the following formula:

$$\frac{\text{the number of denied promotions}}{\text{subjects x number of years studied}} \quad \text{x } 100$$

This procedure was used for two reasons: (a) because the number of subjects studied at each level varied by group and (b) because it permitted the inclusion of data on subjects studied for one or two years and then lost (attrition). The calculations for each group were as follows:

> *Group A:* Pass/fail data, at the Grade 1 level and beyond, were obtained on 7 subjects for 4 years (7 x 4 = 28); 4 for 3 years (4 x 3 = 12); 11 for 2 years (11 x 2 = 22); and 1 for 1 year (1 x 1 = 1) for a total of 63 school years. There were 4 denied promotions. The failure rate for this group, when calculated in this way, was therefore 6.3%.
>
> *Group B:* Pass/fail data, at the Grade 1 level and beyond, were obtained on 1 subject for 5 years (1 x 5 = 5); 6 for 2 years (6 x 2 = 12); and 5 for 1 year (5 x 1 = 5) for a total of 22 school years. There were 2 denied promotions. The failure rate for this group was, therefore, 9.1%.

Group C: Pass/fail data, at the Grade 1 level and beyond, were obtained on 5 subjects for 4 years (5 x 4 = 20); 10 for 3 years (10 x 3 = 30); 5 for 2 years (5 x 2 = 10); and on 8 for 1 year (8 x 1 = 8) for a total of 68 school years. There were 14 denied promotions. The failure rate for this group was, therefore, 20.6%.

Note that the incidence of grade failure in Group C was more than three times that in Group A and more than twice that in Group B.

Grade Levels

In the fall of 1980, the grade levels of the subjects who could still be located were as follows:

Group A
7 of 7 at grade level in Grade 5
3 of 4 at grade level in Grade 4 (1 one year below grade level)
8 of 11 at grade level in Grade 3 (3 one year below grade level)

---

18 of 22 (81.8%) at grade level, 4 (18.2%) one year below grade level

Group B
0 of 1 at grade level (1 one year below grade level in Grade 5)
4 of 5 at grade level in Grade 3 (1 one year below grade level)
5 of 5 at grade level in Grade 2

---

9 of 11 (81.8%) at grade level, 2 (18.2%) one year below grade level

Group C
3 of 5 at grade level in Grade 5 (2 one year below grade level)
5 of 10 at grade level in Grade 4 (3 one year, 2 two years below grade level)
2 of 4 at grade level in Grade 3 (1 one year, 1 two years below grade level)
4 of 5 at grade level in Grade 2 (1 one year below grade level)

---

14 of 24 (58.3%) at grade level, 10 (41.7%) below grade level with 30% of them two years below grade level

Note that (a) the attrition was two of 24 in Group A, one of 12 in Group B and six of 30 in Group C; (b) all of the subjects in Group A were in their fourth, fifth or sixth year in school but 45% of the Group B and 21% of the Group C subjects were in only their third year in school; (c) of the subjects who were below grade level, none in the PG groups (A and B) were below more than one grade, but in Group C, 30% were two years below grade level.

Two children in Group C, but none of the children in Groups A and B, were in opportunity classes.

Failure by sex. In the two PG groups (A and B) all but one of those who failed were boys. In Group C half of the failures were girls and the other half boys.

The results reported in this chapter, which were obtained at post-kindergarten levels, are summarized and discussed in Chapter 12, together with the results obtained at the kindertarten level (reported in Chapter 10).

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12

Summary and Conclusions

We now come full circle to address the question which, from the start, concerned us most. Would the early education program that we offered to our children have for them *enduring* beneficial effects? Our primary objective had been to produce permanent rather than transitory improvements in their competence. Consequently, we had focused more on helping them develop attitudes and cognitive styles which would facilitate mastery in problem-solving situations of any kind rather than on helping them acquire specific kinds of knowledge and skills. Had our strategies worked? To answer this general question we asked a number of specific questions and we have organized the discussion of our results, which follows, with reference to these specific questions.

1. ***Did our preschool graduates (PGs) maintain the intellectual and cognitive gains made by them in the preschool after they were enrolled in the primary grades?***

The answer to this question is a resounding *yes!* The Binet IQs of the two groups of preschool graduates (PGs) did not decline during the course of the study. Instead, they tended to increase over time with significant additional gains being made at the kindergarten level. Even the sample of Group A subjects which was studied through four primary grades maintained its end-of-preschool IQ level throughout this whole time period. Also, in the last project year when 16 of the PGs were tested by a stranger, their IQ scores were not reduced.

Measures of cognitive competence, other than the Binet, were used only up to the end of Grade 1. These were the Circus tests. As measured by these tests the cognitive ability of the two PG groups continued to improve, at least in kindergarten. At entry into kindergarten their scores were still below average, but by the end of the year they were average. They then appeared to maintain these kindergarten gains and again scored at an average level at the end of first grade.

2. *Did the Control subjects without preschool experience "catch-up" to the PGs in intellectual and cognitive competence after entry into school at the kindergarten or the higher grade levels?*

The Control children (Group C) did not make IQ gains in kindergarten which were as great as those made by the PG groups (A and B) during their preschool years. Group C did make a significant IQ gain in kindergarten, but it was not any greater than the additional gains made by each of the two PG groups at this level. Thus, Group C did not catch up to the PG groups on IQ during kindergarten or at any higher grade level. The samples of Group C studied through one or two post-kindergarten years maintained their end-of-kindergarten IQ levels, but the sample studied for three years beyond kindergarten showed, on last testing, a decline toward a level of functioning like that displayed on entry into kindergarten.

The cognitive competence of Group C, as measured by the Preschool Inventory and the Circus tests, did however improve significantly, relative to the two PG groups, during kindergarten and first grade. At both the beginning and end of kindergarten, the two PG groups obtained higher scores than Group C, but at the end of the year the differences between Group C and each of the two PG groups on one measure (functional language) were no longer significant. Also, by the end of Grade 1, none of the differences among the three groups on any of the Circus measures were large enough to be statistically reliable. Although this latter finding suggests that Group C had "caught up" to the PG groups, the differences between them on two measures (Circus "Think It Through" and "How Much and How Many") were still large enough to be meaningful. When evaluated against the available normative data (U.S. national means), the scores of the PG groups were average, but those of Group C were generally below average. However, it is noteworthy that on Circus "Say and Tell," the language measure, Group C (as well as the A and B groups) was performing, on most items, at an average level.

Tests like the Stanford-Binet and the Circus tests, especially the former, are often referred to as aptitude tests or tests which can be used to predict, for example, academic achievement. The results obtained here with these tests are in marked contrast to those reported in most other studies of the compensatory effects of preschool programs (Bronfenbrenner, 1974). although there are some exceptions (Karnes, 1973; Weikart, Bond & McNeil, 1978; Lazar & Darlington, 1982). Usually there has been a gradual attenuation of preschool IQ gains and gains made on other types of aptitude tests during the primary grades and the differences between the preschool graduates and their controls have become negligible.

With respect to the Control group, it is of interest to note that Weikart, et al. (1978) obtained results similar to those found in this study. The gain in the Binet IQ of their Control group from entry into kindergarten to the end of the first grade was 3.8 points. However, by the end of fourth grade this school effect was no longer evident.

3. Was the academic achievement of the PGs superior to that of the "Controls" and did they "fail a year" less often?

The answer to this question is also *yes!* At all levels, the academic achievement test scores of both Groups A and B were higher than those of Group C. The size of the difference was not always statistically significant, especially between Groups B and C, but this was because the sample of Group B subjects was so small. The reader may have noticed that on some tests the difference between the mean scores of Groups A and B was not significant, but that Group A's score (and not Group B's score) was significantly higher than Group C's score even when, as was sometimes the case, Group B's mean score was slightly higher than Group A's score.

It was difficult to assess the strengths and weaknesses of the groups by academic area because no Canadian normative data were available and the use that was made of normative data from the United States for this purpose may have been misleading. What children achieve in school is a function of what they are taught as well as their aptitude for learning, motivation and work habits. For example, at the Grade 3 level none of the groups made significant gains on the Science and Social Studies Test in the Stanford Achievement Primary II Battery, suggesting that what was measured by this test may not have been emphasized in the London schools in Grade 3. Insofar as the use of American norms was appropriate, the pattern of performance was not entirely consistent from level to level. However, the preschool graduates seemed to, by and large, do somewhat better on language and other reading-related tests than on ones that assessed other types of academic ability.

As judged by teachers, the academic competence of Group A (with two years of preschool experience) was clearly superior to that of Group C (the Control group), but the teachers tended to underestimate the actual academic ability of Group B (with only one year in preschool) and to judge this group to be not much more competent than Group C. However, the pass/fail rate in Group B was just about as satisfactory as it was in Group A.

Being promoted is a global criterion of satisfactory academic achievement, but is probably the most meaningful one in this study. On this criterion the two PG groups were clearly superior to the Control group. The failure rate in Group C was three times greater than in Group A and more than two times greater than in Group B. One year after the project ended, 82% of Group A and 82% of Group B, but only 58% of Group C were at an appropriate grade level and 10% of Group C were as many as two years below grade level.

4. ***Did the PG's adjust better to school, have better attitudes and study habits, display more appropriate classroom behavior and seem better adjusted personally and socially than the Controls?***

No firm answer to this question could be obtained from the available data. This was probably due partly to the subjective nature of the measures employed (teacher judgments), and partly to variability in the standards against which the children were judged across the many different schools in which they were enrolled. The Behavior Rating Scales did not differentiate the groups at any level above kindergarten. The information provided by the teachers in response to the more open-ended questions in the School Adjustment Report suggested that there were important differences between the children in Groups A and C in the ways in which they adjusted to school, but in the Behavior Rating Scale data these differences were reflected (when reflected at all) only in trends in the expected direction.

In spite of the questionable reliability of the findings with the Behavior Rating Scale some of the trends in the data were consistent over time. The repeated replication of trends is an alternative method of assessing their reliability which some claim is more appropriate in educational research, with small samples, than tests of statistical significance (Carver, 1978). There were two trends which may be meaningful. The first was the difference between the PGs and the Controls on External Control, a difference which was significant at the kindergarten level, replicated for both Groups A and B at the Grade 1 level and for the samples of Group A studied at the higher levels. One of the goals of the preschool was self-reliance or self-direction and these findings suggest that this goal may have been achieved in the long- as well as the short-range. However, the tendency to make independent decisions, to rely less on teachers for direction and to be less swayed by the opinions of others may have made these children less rather than more attractive to teachers, as has been found by other investigators (Feshbach, 1969; Helton & Oakland, 1977).

The second consistent trend was for the teachers to rate Group B as low or sometimes even lower than Group C and to rate Group A higher than either of the other two groups. This trend, which favored the Group A subjects, was consistent with the data obtained from the responses to the School Adjustment Report. Thus, it is probably fair to conclude that the Group A subjects with two years of preschool experience made, on the average, better social and personal adjustments in school than did those with only one year of preschool (Group B) or those without any preschool experience (Group C).

The finding that the Group B subjects with only one year of preschool experience did not adjust to school any better than the Controls with no preschool experience should, however, be interpreted with caution. There were proportionately more boys in this group than in either of the other two groups. Boys tend to conform less readily in the classroom and the judgments of teachers on a variety of measures have been found to be more adversely affected by how non-compliant a child is than by any other variable (Kohn & Rosman, 1972). However, it should be recalled that Group B finished preschool with a social competence score which was lower than that of Group A; that Group A made its greatest gains in its second preschool year and that these gains appeared to be a function of its greater amount of preschool experience rather than of its greater age. Perhaps the kindergarten did not provide opportunities, comparable to those in the preschool, for improving social skills. If so, this would explain these results.

5. *Were the children who had two years of preschool experience starting at age three more successful in school than those who had only one year starting at age four?*

Overall, the results suggest that the answer to this question is yes. Although the academic achievements of Group B, as measured by the tests and pass/fail rates, were just about as satisfactory as those of Group A, the children in Group B had more ability and appeared to be less disadvantaged than the children in Group A. Half of the Group A subjects had very low ability and it was truly remarkable that they developed and succeeded in school as well as they did. Furthermore, as discussed above, the children in Group B had more difficulty adapting to the social demands of the school than did the Group A children, and this was serious, for it seemed to affect the teachers' judgments of even their academic ability. However, the children who started preschool at age four clearly derived compensatory effects from their early education and their year in preschool seemed to be reflected in the additional cognitive gains which they made in kindergarten.

6. *Did the low-income children who began their early education at age five years derive compensatory effects from their kindergarten programs?*

There was evidence which suggested that the kindergarten produced compensatory effects on the low-income children who started their early education at the five-year-old level, but it was modest as compared with the impact of the preschool. Although Group C made somewhat greater gains than the PG groups during their kindergarten year, these were not enough to close the gaps between them. The kindergarten did not have the impact on intellectual ability (IQ) of the preschool, suggesting that the five-year-old level may be too late to produce a major change in cognitive functioning. This in itself perhaps accounts for the consistent pattern of lower achievement for the Group C than the Group A or Group B children. Group C continued to improve its achievements relative to those of the PG groups during its second year in school, especially in the language area. However, except in language, Group C continued to achieve at a below-average level at all grade levels at which any of the subjects in this group were studied.

Finally, in conclusion, we recognize that the sizes of the samples available for study in the follow-up were not large. However, certain aspects of the project strengthen it and support the assumption of validity for the findings. The first and most important of these is that a substantial number of the children were studied for as many as four years after they entered the primary grades and the main findings were replicated at each grade level. Second, all but a very few of the subjects were studied during at least their first two years in school. These two years are the *critical* years because, by the end of them, most investigators have found that IQ and other gains made by children in compensatory preschool programs have been lost.

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Epilogue: The Perspective in 1983 and Its Implications for Social Policy

Those who undertake long-term studies are often frustrated in mid-stream because they acquire new knowledge which makes them doubt the wisdom of their original assumptions, the adequacy of their methods and sometimes even the significance of the questions they have addressed. Did this happen to us?

In the past decade efforts have continued, although not on the grand scale of the late 1960s, to resolve at least some of the many issues which plague both teaching and research in the early childhood education field. New knowledge and new insights have been gained, but there is still much controversy and the debates continue. Should we think of early education in "compensatory" terms? Do children from economically disadvantaged homes have deficiencies of a cognitive or motivational sort which arise out of their life conditions, or are they just different? Have preschool programs with compensatory goals been shown to be effective in the long- as well as the short-term, and, if so, what kind of program is "best" and how should it be implemented?

We can now say with confidence that preschool education of high quality can achieve certain academic goals, but the list of other unresolved questions has not been reduced, nor is it likely to be, until more of the problems faced by researchers in the field are solved. One of these is the lack of adequate criterion measures for judging the outcome of programs on non-intellectual and non-academic variables. Another is a lack of methodological sophistication in the measurement of specific program variables and in relating program outcomes to such variables. Very different programs have produced very similar benefits and we can only speculate about what caused them. Let us consider, however, what progress has been made in resolving the issues which were of greatest concern in our project.

Compensatory Education: Can This Notion Be Justified?

The deficit hypothesis on which the notion of compensatory education is said to be based was unacceptable to some in the early 1970s and it continues to be unacceptable to some today. New voices are making the old claims, namely that it reflects middle-class bias which equates differences with deficits and places the blame for academic failure on the child rather than on the school or societal variables where it belongs (Edwards, 1979; Stipek, Valentine & Zigler, 1979). There is also some new evidence that challenges the deficit hypothesis. For example, Ginsburg and Russell (1981) have reported results which suggest that at least in the case of mathematics, school failure cannot be explained by deficits at school entry in basic mathematical skills. Yet others continue to find that the cognitive "readiness" of lower-class children at school entry is significantly lower than that of middle-class children (Hall & Kaye, 1980). Discrepant results such as these are usually the result of variation across studies in the criterion measures used, but we can only conclude that the question of whether lower-class children start school with cognitive handicaps, or develop them later, is still a controversial issue.

The possibility that they do enter school with such handicaps is suggested by the many *hazards to development* which occur in impoverished homes (Marjoribanks, 1979). These hazards have been listed and vividly described (Robinson & Robinson, 1976; Keniston & the Carnegie Council on Children, 1977). Some are health hazards, some are physical hazards and others are psychological hazards. The latter derive in large part from the impact of poverty and its concommitants on the parents, which impairs their capacity to sense and meet the needs of their children and deal with them in rational ways. For example, Steinberg, Catalano and Dooley (1981) have shown that an economic change for the worse, resulting from the loss of a job, is the antecedent of increased child abuse. Hetherington, Cox and Cox (1978) have documented the effects on mothers of the loss of a spouse through divorce or separation which is a frequent concommitant of poverty. They have described how the personal problems the single mother faces influence her relationship with her children and how her difficulties are compounded by meager financial resources. The disruptive effects on the cognitive abilities of children, which have been found to follow the withdrawal of one parent from the home may, however, be only temporary, and this type of effect may be greater in middle-class than in lower-class homes (Shinn, 1978; Ginsburg & Russell, 1981), perhaps because single parenting is less acceptable in such homes. It seems reasonable to assume, however, that children with two parents have a better chance of receiving developmentally productive cognitive stimulation than do children with only one parent (Zajonc, 1976).

Both middle- and lower-class homes vary widely in the resources for cognitive development which they provide. A recognition of this has led to new attempts to identify specific variables in the home environment which influence the development of cognitive abilities in children (Taylor, 1979; Carew, 1980). Bradley and Caldwell (1980) developed a Home Observation for Measurement of the Environment (HOME) Inventory and found substantial correlations between HOME scores and Binet IQ scores for both boys and girls. This work has, however, been criticized on the grounds that parental ability and environmental variables were confounded (Willerman, 1979). Willerman's review of the literature led her to conclude that the amount of variance in IQ which can be accounted for by the environment is still unknown, but that the idea that lower-class environments are barren of intellectual opportunity is false. *Lower-class children may not, however, be "attuned," as Willerman put it, to extracting information from their environments.*

No apology is therefore made for the use of the word "compensatory" in the title of this monograph. We chose it, regardless of the controversy surrounding it, because it is informative. It says exactly what we tried to do. Our best guess in the 1970s and our best guess now is that low-income children do not, on the average, have opportunities for cognitive development in early childhood which are equal to those of most middle-class children and as a result function in the elementary school at levels way below their capacity. *We did not, however, think in terms of deficits. We expected to find, and we found, overlap in the cognitive abilities of our two socio-economic groups and wide individual differences within each group.* It will be recalled that the subjects were selected without pre-testing and all of them appeared to be, and were considered to be by parents and social workers, "normal" children. It now appears, from our own results, that prosperous families also vary widely in the amount and kind of resources for growth that they provide for their children. In our program, about half of the children from such families seemed to derive as much benefit from it as did the low-income children. *It can be argued, then, that all "good" education is "compensatory,"* in that it supplements the home in providing opportunities for development that the home is unable or unlikely to provide.

The Critical Stage Hypothesis: Would We Still Favor It?

Our assumption that children at the preschool level are at a critical stage in their cognitive development and must receive adequate support for their cognitive growth at this time if they are to realize their full potential, is still both a theoretical (Oyama, 1979) and an empirical question. *Some argue that humans have a capacity for change across the entire life span* (Brim & Kagan, 1980), and high quality programs at either the infancy or preschool level have been shown to have positive long-term effects (Lazar & Darlington, 1982). Others are of the opinion that higher IQs following preschool education are more likely to be the result of changes in *motivation* than of any real change in cognitive functioning (Zigler & Butterfield, 1968; Zigler, Abelson & Seitz, 1973; Zigler, Abelson, Trickett & Seitz, 1982). The improvements in performance which we observed in our preschool may have been due more to changes in motivation (increased trust in self as an effective change-agent, increased interest in finding out about the world, increased trust in the adult society) than to changes in cognitive structures. We were aware of the motivational hypothesis at the start of our project and it was for this reason that we expended so much effort in trying to find, or develop, methods of assessing what we called cognitive and learning styles (including mastery motivation) and social competence. We were in agreement with Zigler (Zigler & Trickett, 1978) that IQ and academic achievement are inadequate as the sole measures of program effectiveness.

In support of *the motivational theory* we did find that our low-income children made, during their first year in preschool, their greatest gains not only on the Binet, but on our measures of cognitive and learning styles and that this was true whether they were enrolled at the age of three or four years. The gains in these areas then seemed to "pay off" in their second year in school for it was then that they made their greatest gains on achievement tests and in social competence. Other bits of evidence in our data are also consistent with the view that low-income children do poorly on tests, in part because they distrust both themselves and others and that test score gains made in the preschool are at least in part due to changes in these attitudes. On the Preschool Inventory, the strongest compensatory effect obtained when the children were in their first preschool year was on the "Don't Know" score. The highly significant differences which were found on this score between the high-income and each of the low-income groups at the initial test time disappeared at the second test time and did not reappear later. The reduction in the very high "Don't Know" scores of the low-income groups from the beginning to the end of their first preschool year was truly remarkable. On Circus "Say and Tell," the low-income children had most difficulty with Description, a section in which they were required to respond to direct questions which had a right answer. The teachers also noted the low-income children's difficulty in coping with direct questions. This suggests some kind of "wariness" of adults of the sort that Zigler and his colleagues (1982) have studied and our attempts to modify this were only partly successful.

Therefore, *changes in motivation probably play an exceedingly important part in improving the competence of children in the preschool, and perhaps later, but this does not prove that cognitive changes, such as an increase in knowledge and the acquisition of new strategies for utilizing that knowledge in problem-solving situations, do not also play an important part.*

Why the New Optimism About Preschool Education?

The gloomy pessimism of the early 1970s about the possibility of obtaining compensatory effects *when intervention was delayed until children were aged three and four years* has been replaced by a new wave of optimism. The turning point seems to have come when F. H. Palmer (Note 1) reported new follow-up data on the long-term effects of a variety of intervention programs which were mounted in the 1960s. He presented his findings in 1976 at the annual meetings of the American Psychological Association. He said that a consortium of 12 investigators, who had intervened with low-income children at different age levels (infancy to kindergarten), in different ways (home-based, preschool based), for different purposes (to measure the effects of specific strategies or to measure the effects of a special type of curriculum) had undertaken to re-locate their subjects and find out what progress they had made in school. At the follow-up time the children ranged in age from nine to 19 years. The preliminary results of this work were very exciting to early childhood advocates. The evidence looked convincing that children who had been exposed to almost all of these various kinds of early interventions were more often in an appropriate grade for their age and were less often in special education classes than were their controls. The final results of this cooperative effort, in which an attempt was made to pool all of the data, were later published (Lazar & Darlington, 1982). They confirmed the preliminary findings that the children who attended the programs were significantly more able to meet the school's basic requirements than were their controls. It should be emphasized, however, that all of the interventions were conducted for research purposes by highly competent investigators, and all were *carefully supervised.* In short, *they were all programs of high quality.*

Included in the Consortium's data were the preliminary results of three major longitudinal studies that are of particular interest here because they were concerned with the effects of *preschool* experience on later academic achievement. These studies were in progress when the UWO Project was initiated, but have now been completed. They are: Miller and Dyer's comparative study of four program models in Louisville, Kentucky; Weikart's study of a preschool program operated in the Ypsilanti, Michigan, school system (the Perry Preschool Project); and Weikart's comparative study of three different laboratory-based program models (the Ypsilanti Preschool Curriculum Demonstration Project). The much-awaited results of Miller and Dyer's massive project were very disappointing, but the findings of the Perry Preschool Project and the Curriculum Demonstration Project were very encouraging, especially those obtained in the latter project. All of the subjects in these studies were from low-income families and all of the programs had compensatory objectives.

Miller and Dyer (1975) initiated their project in 1968. The four types of programs compared were traditional Head Start, Montessori, DARCEE (Demonstration and Research Center for Early Childhood Education, developed at Peabody College) and Bereiter-Engelmann's language program (Bereiter & Engelmann, 1966). The subjects were enrolled in preschool for *only one year,* but attended for six and one half hours, five days a week. They were then followed up in the elementary school with some in follow-through classes and others in regular classes. At the preschool level, the largest IQ and achievement gains were made in the most focused academic programs (Bereiter-Engelmann and DARCEE), but these were small, and at the elementary school level, when there was a general decline in IQ in all groups, this was greater in the Bereiter-Engelmann than in any of the other three groups. In the long term, no significant program effects were found for academic achievement. There was, however, some modest evidence of differential effects of programs on non-cognitive variables such as inventiveness, curiosity and verbal-social participation, with the less structured programs producing more positive outcomes. The findings of this study were, however, difficult to interpret because of *methodological problems.* For example, the control group appears to have been more advantaged than the experimental groups. The disappointing results of the study may, however, have been due to insufficient supervision of the programs to insure that they were of *high quality,* or to the fact that the children were in their programs for only *one* academic year.

The Perry Preschool Project was initiated in 1962 (Weikart, Bond & McNeil, 1978) and the children who participated in it between 1962 and 1967 have now been followed up through age 15 (Schweinhart & Weikart, 1980). All of the subjects except those in the first wave (entry 1962) were enrolled in the preschool at the age of three and attended for *two* years. They then went on to regular classes in the elementary schools. The Cognitively Oriented Curriculum which was later described in detail (Weikart, Rogers, Adcock & McClelland, 1971) was developed during the 1960 period. The program went through a series of changes and at first was not based, as it was later, on Piagetian theory. The evolution of the program was described briefly in the report of the follow-up study through grade four (Weikart, Bond & McNeil, 1978), but in greater detail in the Foreword of *Young Children in Action* (Hohmann, Banet & Weikart, 1979). The results of the Perry Preschool Project cannot, therefore, be looked upon as an evaluation of the High/Scope Cognitively Oriented Curriculum as it was described in 1971 or in 1979. Nevertheless, the education offered was *thoughtfully planned and carefully executed* and it achieved some important objectives. By the end of treatment, the preschool group had gained 15.3 Binet IQ points, and scored 11 points higher than the control group which had no preschool experience. After the groups entered elementary school the differences between them on aptitude scores (including IQ) diminished and were no longer statistically significant by the end of second grade. However, on academic achievement tests the preschool group performed significantly better than the control group and the differences between the groups actually increased over time. Also, the overall school success of the preschool group was superior to that of the control group. By the end of fourth grade, 83% of the preschool children and only 62% of the controls were at the grade level appropriate for their age and significantly fewer of the preschool than the control children had been assigned to special education classes.

When the children were followed up through age 15 it was again found that at eighth grade the preschool group was meeting the demands of school better and achieving higher scores on achievement tests than was the control group. A tentative explanation of these findings, based on additional evidence obtained at this time, was that those with preschool experience placed *a higher value on schooling,* were *more committed to doing well in school* and received more reinforcement for their efforts than did their controls. Also, because incompetence in school is so often associated with deviant behavior, an attempt was made to determine whether the preschool had *had an effect on the incidence of juvenile delinquency.* The findings suggested that it had. Self-report measures indicated that 52% of the control group, but only 36% of the preschool group had displayed a sustained pattern of delinquency (defined as five or more offenses).

The Ypsilanti Preschool Curriculum Demonstration Project (referred to as the CD Project) was initiated in 1967 (Weikart, Epstein, Schweinhart & Bond, 1978). Its central purpose was to compare the *effects of three different preschool curricula* (or program models) on economically disadvantaged children. The three curricula were cognitive—the High/Scope Foundation's Cognitively Oriented Curriculum (Weikart, et al., 1971); language—Bereiter-Engelmann's Language Training Curriculum (Bereiter-Engelmann, 1966); and Unit-Based—a curriculum based on the traditional American nursery school (McClelland, Martin, Malte & Richardson, 1970). All three programs were implemented in Ypsilanti under laboratory conditions and every effort was made to control all non-curriculum variables which might influence the results. Also, *strong administrative support* was given to each program so that its *quality* would be maintained at a high level. The subjects attended their preschools for *two* years, starting at the age of three years. They were then enrolled in regular classes in the elementary school and were followed up through fourth grade. All three programs proved to be effective in producing *large IQ gains* at the preschool level and, what is most important, *these gains were maintained five years after the children entered elementary school.* All three programs were also *effective in increasing school success.* The children in the project were only half as likely to be retained in grade (to fail) or to be placed in special education classes as were their controls.

Is There a "Best" Program Model?

The CD study provided support for the new optimism about what compensatory preschool education could accomplish, but it did nothing to solve the problem of what curriculum model was the best. Although the Bereiter-Engelmann program had the greatest immediate impact on IQ, in the long term all three programs proved to be equally effective. Are we justified in concluding, therefore, that any type of program can achieve at least intellectual and academic achievement goals if it is of *"high quality"?* Perhaps we are, but if so, *we must decide what "high quality" means and how to produce it.* We can begin by asking what made these three programs so successful when so many others have failed. One possible reason is that the children attended the preschool for *two* years, but Weikart and his colleagues believe that it was because of *the way the programs were operated.* They drew attention to four operating principles, which were applied in each of the programs, which they considered to be the "key" to their success. First, there was a *curriculum* which gave focus and purpose to the teaching process. Second, the *staff* was kept *highly motivated* and dedicated by involvement in problem-solving and decision-making about how to implement the program. They received training but were not "trained." They had the satisfaction of experiencing growth that was achieved through their own efforts. Third, *morale* was maintained at a high level. There was no boss who determined what would be done. The interactions between the supervisor and staff were circular. Communication among staff members was open and each member shared responsibility. Fourth, *feedback* was provided regularly to help the teachers evaluate their work.

This interpretation was of great interest to our group at Western Ontario because, in the operation of our program, every one of these four principles was applied. The descriptions which have been provided of how we carved out the curriculum and worked together to implement the program will have made this clear. Hence, perhaps the way our program was operated was the key to our success. Although I cannot accept this idea completely and am confident there is more to it than that, I must confess that, as Director of the program, from the very start, my intuition told me that nothing would work unless we functioned as a *team,* were in *agreement* about our goals and *committed* to them, felt that we were *learning* and developing as we met the challenges, and had some way of estimating the success of our efforts. Doing the *evaluation* study seemed to me to be absolutely essential to the success of the program.

If these are in fact the four key elements for success, then it is not surprising that so many programs have failed. To provide the kind of leadership which is required is not easy, nor are leaders who are able to provide it always readily available. But, if we accept that *leadership* is essential, then this has important implications for policy makers and those who have the responsibility for maintaining the quality of our day nurseries and early education classes, especially those serving children who may have special needs. In Ontario, following the passage of the first Day Nurseries Act in 1946, which set standards for the licensing of nursery schools as well as day nurseries, the Day Nurseries Branch of Government, which was established to administer the Act, provided *resource persons* to help operators meet the new requirements, especially those which pertained to the educational component. These resource persons were well-trained nursery school specialists and they worked *with* the teachers, helped them clarify their goals, select equipment, design the nursery environment, and acquire new knowledge about child development and child guidance principles. They also encouraged them to meet with teachers in other nurseries with whom they could share their problems and concerns and helped them find additional resource persons in their communities. These efforts were highly effective in improving the quality of Ontario's nursery programs. In more recent years, however, the personnel who were once resource persons have become little more than inspectors who visit a nursery, often only once a year, to make sure the requirements of the law are being met. This is, in view of the importance of leadership, little less than tragic and in need of review. School boards who now operate pre-kindergarten classes with compensatory goals should also take note of this need for leadership. They might try to turn their kindergarten consultants into something more than supervisors or advisers. Perhaps the consultants could be encouraged to work with groups of pre-kindergarten teachers, if it is impractical to work with them individually. In such groups the teachers and consultant could work together at clarifying goals, hammering out curricula, finding ways to implement a program under varying conditions and developing practical ways of obtaining feedback about the success of their efforts.

Returning to the question *"which program model is best?"* the answer seems to be that at this point no one knows. Much more research and more sophisticated research will be required before a better answer to this question is forthcoming. So far we have learned something about the elements in a program which make it effective in achieving cognitive and academic achievement goals, but we have yet to determine the kind of program which is most effective in producing *non-academic goals,* and to some these are the most important for preschool education. Thus, *values* will probably continue to determine the choice of program model for some time to come. However, if we were going to start all over again with our project we would still use the same kind of educational approach. This is because our results indicated that the program was well balanced with respect to our goals and induced personal and social growth (especially when we had the children for two years) as well as cognitive development.

Our Curriculum: Would We Change It Now?

Having said we would use the same educational approach again, would we modify our Assessment and Curriculum Guides? Has anything new been added to our knowledge of child development which has implications for what should be included in a preschool curriculum?

Piaget described the cognitive abilities of preschool (preoperational) children in negative rather than positive terms. He wrote more often about what they could not do than of what they could do. For a long time this led others as well to focus on their limitations rather than their strengths. Now, however, a great deal of evidence has piled up against the notion that preschoolers are cognitively inept. Gelman (1979) in a summary of this evidence pointed out that preschoolers are less egocentric and more able to take the perspective of another than anyone supposed, that they can count and can understand a great deal about the nature of number, that there are many conditions under which they can classify, that they are sensitive to temporal order and believe that causes precede their effects and finally that they have impressive memory abilities as reflected, for example, in their rapid acquisition of language abilities. She speculated on why it has taken psychologists and educators so long to recognize these abilities, suggesting that the expectancies engendered by Piagetian theory were in part to blame, but that in addition children had been tested on inappropriate tasks. She described some of the difficulties in designing tasks for young children which do not interfere with the use of their real cognitive capacities. Some of her suggestions about how to make a task suitable for preschoolers, by reducing its complexity, avoiding ambiguous words or pre-training in the meaning of the words before testing, and embedding the problem in a game-like situation of the sort children like to play are all relevant to the problems we attempted to solve in developing our Assessment and Curriculum Guides.

The work of Brainerd (1979) about which we had some knowledge while we were developing the Guides continues to support the view that children develop an understanding of the concept of ordination before they develop a concept of number and that the concept of cardination develops considerably later. If Brainerd is right, then our Curriculum Guide for Number should be modified to reflect this developmental sequence. The teacher should also be advised that when introducing a child to number only the ordinal meaning should be used and the first games played should involve only counting and seriation. Furthermore, before introducing children to activities which involve determining the number of items in a set the teacher should make sure that they have a well-established understanding of ordinality.

There is still, however, much controversy about the age at which conservation concepts are acquired and the developmental sequence of understandings which lead up to the mastery of various concepts. Recently, an innovative way of tackling the sequence problem was suggested by Siegler (1981). He used a rule-assessment approach based on the assumption that cognitive development "can be characterized in large part as the acquisition of increasingly powerful rules for solving problems" (p. 3). Siegler's subjects included four-year-olds and his findings supported the view that children do progress through a series of alternative understandings before mastering a concept. It is interesting to speculate on the implications of this work for teaching practice. Perhaps we might think in terms of rule discovery.

Thus, there are some new ideas in the literature which could be used to revise the Assessment and Curriculum Guides and some useful information about how to plan problem-solving tasks which are appropriate for preschoolers.

The Implementation of the Model: Was Our Program Up-to-Date?

Have others who operate cognitively oriented programs achieved new insights into the "whats," "hows" and "whys" of implementing such a program which would modify our thinking?

Programs which claimed to be cognitively oriented got their start in the 1960s, but since then have gone through a series of transformations. The way they function today bears little resemblance to the way they functioned a dozen years ago. The changes that have occurred reflect not only the continuing struggle to interpret the implications of Piagetian theory for educational practice (Duckworth, 1979; Kuhn, 1979), but a degree of receptivity to the views of the ever-increasing number of persons who are challenging that theory and also knowledge acquired through practical experience.

Early programs based on Piagetian theory were aimed at acceleration and endeavored to accomplish this by laying the foundation for the emergence of concrete operations. Piagetian tasks formed an important part of the curriculum. The child's action on objects was viewed as an important part of learning and drill was usually avoided, but some direct instruction was given. Curricula were carefully planned and tightly sequenced and in some cases learning "kits" were developed. Language was stressed, sometimes to the point of "bombardment."

In the 1970s, this approach began to be regarded as un-Piagetian, especially the goal to accelerate, the tendency to instruct and the emphasis on language. A new phase then began in which attempts were made to activate thought processes by conflict inducement. Programs were planned to stimulate active involvement, curiosity and independent exploration. In fact there was a return to some of the more traditional nursery school practices. The role of the teacher was not, however, viewed in traditional terms. The teacher was active, not passive or just responsive. The teacher's task was to "disequilibrate" the child by drawing attention to discrepancies and contrasts and to put him or her into ambiguous situations which would induce problem-solving thought. For this purpose, thinking games of various sorts were invented. The goal was to produce cognitive growth through cognitive challenge. In this phase the emphasis on language disappeared.

Currently, there is a general acceptance of the principle that children construct their own knowledge and do so when actively involved in experiences of their own making. The teacher is therefore viewed as a *facilitator* of the child's cognitive development. It is the way in which the teacher interacts with the child that is important. The teacher must know when to act and how to act in ways which will induce thinking. Thus, the attempt to define the teacher's role and the search for effective teaching strategies continues. Language is again considered to be an important part of the curriculum, but it is used more to describe concepts than to induce them.

The evolution of the High/Scope Cognitively Oriented Curriculum provides an excellent illustration of a program which went through these three phases and its history has been well described (Hohmann, et al., 1979). Currently the group in Ypsilanti thinks in terms of "key" experiences which they try to make sure every child has by providing appropriate resources in the preschool environment and teacher-guided activities, often offered to small groups. The stress is on encouraging the children to take the initiative, make decisions, make plans, carry them out and evaluate their efforts. Both teacher and child are seen as playing an important role in facilitating development.

Our program was launched when other cognitively oriented programs were in their second phase of application. At the time, many early educators were reacting negatively to the programs that had developed in the 1960s and to avoid misunderstanding we chose not to call our program a cognitively oriented one. Early on we had decided that we would offer no direct instruction and would preserve what we considered to be the best in the traditional Ontario preschool program, which had been developed in the 1940s at the University of Toronto's Institute for Child Study. The stress in that program was on encouraging independence, decision-making, planful and purposeful behavior, creativity, exploration, interpersonal sensitivity and responsibility. We then tried to build more cognitive stimulation into this program. Piagetian theory did, however, influence our selection of number, classification and spatial relations as special curriculum areas as well as our decisions about how language development would be fostered. We also used some of Piaget's ideas about the "disequilibration" process to develop strategies for involving the children in, and maintaining their interest in, thought-inducing problem-solving tasks. When developing the Assessment and Curriculum Guides we did not, however, depend on Piaget. We turned directly to the scientific literature for empirical data.

It seems fair to say then that the program we developed was reasonably up-to-date as far as contemporary thought about the implementation of a cognitively oriented program is concerned. During the whole project we were constantly preoccupied with the question of how the teachers should interact with the children to facilitate their growth. We believed that parents who are successful in raising intellectually competent children do more than respond to their spontaneous interests, that they constantly transmit information, albeit in informal situations, and constantly endeavor to lead their children into new discoveries which are intellectually stimulating. Currently, there is much research interest in the dynamics and cognitive effects of different kinds of mother-child interactions (Carew, 1980). Hopefully, this will ultimately lead to a better understanding of the kind of teacher-child interactions which produce the most intellectually valuable kinds of experience for children.

Social Competence: Did We Gain New Insights for Its Promotion?

The results of our own research on the measurement of social competence might have, had we completed this work sooner, influenced some of the strategies we used for helping the children improve their social competence. The finding that social competence was reflected primarily in the effectiveness of children's attempts to influence their peers suggests that teachers might do well to encourage children to use a problem-solving approach in interpersonal conflict situations. In this the teacher would help the child clarify goals, consider cause and effect relationships and the options for action to achieve the desired social goal, as well as encourage experimentation. Our results indicated that cognitive competence is related to social competence, suggesting that the latter can be improved by utilizing more effectively the former. In short, it appears we should help children use their "heads" as well as their "hearts" in solving interpersonal problems.

IMPLICATIONS FOR SOCIAL POLICY

1. ***We can now say with confidence that low-income children can derive substantial lasting benefits from early education at the preschool level.*** Even when it's delayed until children are three or even four years old, preschool education can improve educational achievement, reduce failure rates and the need for special education and, perhaps, also modify attitudes, values and aspirations. However, only programs of *high quality* have accomplished such goals so it is of paramount importance that if compensatory early education programs are offered they be operated well.

2. ***No particular program model has been proven to be better than any other.*** Policy makers can therefore afford to be flexible and responsive to local preferences, but again it is emphasized that every effort should be made to insure that whatever type of program is offered it is of *high quality*. To insure quality, *child-to-teacher ratios must be kept low*. In successful programs they have averaged five to one and never more than eight to one. In our program the ratio was seven to one.

Resource persons must also be made available who can provide effective leadership, insure that there is a focus in the programs and that the morale of the teachers and their desire to be effective with the children is maintained at a high level.

3. ***Early education can help, but is not likely to solve all of the problems of poverty.*** Earlier it was said that the critics of early education for low-income children claim that the blame for their problems in school should not be placed on the children themselves, but on the societal institutions which perpetuate the conditions which give rise to these problems. *Societal structures* do determine many of the difficulties faced by children and families in poverty (Keniston & the Carnegie Council on Children, 1977) as do governmental family policies. In a study of *family policy* in 14 countries, Canada was described as having no explicit or comprehensive policy (Kamerman & Kahn, 1978) and Barbara Chisholm (1981), a well-known Canadian child advocate, has decried the lack of governmental support for the nurturing functions of parents in Canada. Thus, there appear to be some broad challenges in this area which Canadian policy makers should make haste to address. In our follow-up study we discovered that many low-income children do poorly in school for reasons that have nothing to do with their ability or desire to do well. Their families are often highly mobile and as a result the children are frequently uprooted and moved from one school to another. They are also often absent from school, sometimes for very long periods. Therefore early education is not the sole answer to the problems children from impoverished homes face in their attempts to achieve in school, but it can be an important part of the answer. It has been demonstrated that it gives at least some of those children, many of whom have a great deal of natural ability, the opportunities they need to develop and pull themselves out of the welfare cycle.

4. ***Two years in preschool, starting at age three, appear to be more effective than only one year for improving the social abilities as well as the academic achievements of low-income children.*** However, one year in a program of high quality can go a long way toward improving at least their academic achievement.

5. ***Major efforts to modify the values and attitudes of parents are not essential for the success of an early education program.*** Although some have argued that the positive effects on low-income children of early education will persist only if there is a change in the child's family (Bronfenbrenner, 1974), programs in which no efforts to produce such changes have been made have also been successful (Lazar & Darlington, 1982).

6. ***The cost-benefits of early education for children at risk because of poverty appear to be substantial.*** Although they are difficult to assess, an economic analysis of the benefits of the Ypsilanti Perry Preschool Project was attempted (Weber, Foster & Weikart, 1978). In this the two major benefits on which the calculations were based were (1) cost saving for school districts resulting from fewer students in the experimental group who required expensive special education programs and (2) higher anticipated lifetime earnings for the experimental subjects because of their greater educational attainments. *The analysis indicated that the first of these two benefits was enough to pay for one year of preschool, and that when the second was added to the first, the savings were sufficient to pay for two years of preschool.* A commentary by Roger Grawe, an economist with the World Bank, is included in the report of this work. Grawe said that in such evaluations the costs of the alternative to preschool participation (i.e., staying at home in the case of the controls) should also be estimated and that these should be set off against the costs of the preschool education to arrive at the incremental cost of the intervention. He pointed out that in the evaluation of the Perry Preschool Project an adjustment on the cost side of this kind would have greatly increased its estimated profitability. Additional information about the economic implications of this project, in 1979 dollars, has been provided by Schweinhart and Weikart (1980).

7. ***Finally, to sum up, the research on preschool education now tells us what our common sense has always told us, that children will benefit from good experiences especially when they are young and that this can produce for society savings in dollars.*** The implications of this are obvious. More opportunities for children from families on welfare to participate in early education programs should be provided. Barriers which prevent them from obtaining access to day nurseries, which cater primarily to the children of working parents, should be broken down. Among our multiproblem families there are many children with much talent who could make a substantial contribution to society. They represent a valuable pool of human resources and, at this time when the birth rate has reached such a low level, it seems imperative that every effort be made to develop these resources.

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A CANADIAN APPROACH

COMPENSATORY EDUCATION IN THE PRESCHOOL

Dr. Mary Wright is Professor Emeritus in the Department of Psychology of the University of Western Ontario. Her interest in compensatory early education was sparked by her experience in the training of staff for Britain's nurseries during World War II. In 1949, Dr. Wright joined the faculty at Western Ontario as a child psychologist. As chair of the Department of Psychology from 1960-1970, she promoted the establishment of the University Laboratory Preschool. In 1973, as first Director of the preschool, Dr. Wright initiated the preschool study described in this book.

n 1973, Canadians were just beginning "to launch" on a large scale, pre-kindergarten classes to aid the disadvantaged child. Canadian research in this area was desperately needed.

Consequently, Dr. Wright and her colleagues launched the University of Western Ontario Preschool Project in 1973 to study the effects of compensatory education on low income children. Three groups of children attended the preschool: a high income, high-ability group, a low income, average-ability group, and a low income, low-ability group. The children were tested for growth in intellectual and cognitive abilities, problem solving styles and strategies, and social competence. The author reports: "All three ability groups made significant gains over time on all of the measures." Dr. Wright concludes: "My faith in the potential of preschool education for producing miracles in disadvantaged children is firmly established."

This book is unique. It not only describes the research, reports the findings and addresses policy issues, but also describes the curriculum used in the project in sufficient detail to permit replication in other preschools. There are timetables for teachers, suggestions for use of classroom space and materials, curriculum guides in the areas of number, classification and spatial relations, and a wealth of ideas for classroom activities.

COMPENSATORY EDUCATION IN THE PRESCHOOL is for a wide variety of audiences: students, early childhood educators, researchers, child advocates concerned with protection and prevention, policy and decision makers in the educational and welfare fields, and parents.

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